



FRIDAY, JUNE 29.

MASTER MECHANICS' ASSOCIATION.

Sixteenth Annual Convention.

The Sixteenth Annual Convention of the Master Mechanics' Association began at the Grand Pacific Hotel in Chicago on Tuesday, June 19. The Convention was called to order at 10 a. m. by President Reuben Wells, and the proceedings opened with prayer, offered by Rev. Dr. Bristow.

The President then introduced Hon. Carter Harrison, Mayor of the city, who welcomed the members to Chicago in a brief address.

The roll was then called by Secretary Setchel, when the following members answered to their names:

ACTIVE MEMBERS.

H. Anderson.
R. W. Bushnell, Burlington, Cedar Rapids & Northern.
J. Davis Barnett, Grand Trunk.
John Black, Cincinnati, Hamilton & Dayton.
John Bisset, Chicago & Darlington.
F. G. Brownell, Burlington & Lamoille.
H. S. Bryan, Chicago & Iowa.
S. M. Cummings.
G. A. Coolidge, Fitchburg.
David Clark, Lehigh Valley.
H. L. Cooper, Lake Erie & Western.
George Cushing, Northern Pacific.
Charles H. Cory.
J. G. Clifford, Illinois Midland.
Allen Cook, Chicago & Eastern Illinois.
Henry Elliott.
James Eckford.
A. G. Eastman, Southeastern of Canada.
J. H. Flynn, Western & Atlantic.
Wm. Fuller, New York, Pennsylvania & Ohio.
W. A. Foster, Fitchburg.
H. D. Gordon, Phila., Wilmington & Baltimore.
Charles Graham, Delaware, Lackawanna & Western.
James Gordon, Concord.
J. S. Graham, Lake Shore & Michigan Southern.
John Hewitt, Missouri Pacific.
O. A. Haynes, St. Louis, Iron Mountain & Southern.
S. A. Hodgman, Philadelphia, Wilmington & Baltimore.
Geo. Hackney, Atchison, Topeka & Santa Fe.
N. W. Howson, Cumberland & Pennsylvania.
J. B. Johnson, Allegheny Central.
Wm. Lannon, House of Representatives.
Jacob Losey, Steam Forge Co.
J. N. Lauder, Mexican Valley.
A. Mitchell, Lehigh Valley.
G. F. Morse, Portland Company.
James Magleann, Carolina Central.
J. McKenna.
John McFarland, Chesapeake & Ohio.
M. M. Pendleton, Seaboard & Roanoke.
P. J. Perrin, Taunton Locomotive Works.
C. R. Peddle, Terre Haute & Indianapolis.
G. W. Prescott, Cairo & St. Louis.
T. W. Place, Illinois Central.
Amos Pillsbury, Eastern.
J. S. Porter, Indiana, Bloomington & Western.
Geo. Richards, Baltimore & Potomac.
G. W. Reynolds, Old Colony.
Henry Schlacks, Illinois Central.
W. T. Smith, Philadelphia & Erie.
James Strode, Northern Central.
J. H. Setchel, Ohio & Mississippi.
James Sedgley, Lake Shore & Michigan Southern.
E. M. Sanborn, Lake Shore & Michigan Southern.
H. N. Sprague, E. K. Porter & Co.
W. H. Selby, Wabash, St. Louis & Pacific.
G. B. Simonds.
B. J. Sitton, East Tennessee, Virginia & Georgia.
Will A. Short, Canada Southern.
T. B. Twombly, Chicago, Rock Island & Pacific.
W. F. Turrett, Cleveland, Columbus, Cincinnati & Indianapolis.
J. K. Taylor, Ohio Central.
W. H. Thomas, Louisville & Nashville.
John Thumser, Ohio & Mississippi.
Thomas Walsh, Louisville & Nashville.
B. Warren, St. Louis, Alton & Terre Haute.
Reuben Wells, Louisville & Nashville.
C. W. White, Louisville & Nashville.

ASSOCIATE MEMBERS.

M. N. Forney.
J. O. D. Lilly.
Lewis F. Lyne.
F. B. Miles.
Coleman Sellers.
Willard A. Smith.

NEW MEMBERS.

The following new members then signed the roll and were admitted:

Edward Evans, Cincinnati, Washington & Baltimore.
James Cullin, Nashville, Chattanooga & St. Louis.
Howard M. Smith, St. Louis Bridge & Tunnel.
A. W. Sullivan, Illinois Central.
B. R. Carding, Raleigh & Gaston.
Albert Griggs, Providence & Worcester.
C. E. Scruten, East & West.
G. W. Gates, Concord.
W. L. Gilmore, Cleveland, Columbus, Cincinnati & Indianapolis.
H. Middleton, St. Paul, Minneapolis & Manitoba.
J. C. McCuen, Sonora Railway.
E. M. Roberts, Chicago & Iowa.
A. H. Watts, Kentucky Central.
L. D. Berry.
E. A. Campbell.
John Hickey, Milwaukee, Lake Shore & Western.
John Campbell, Lehigh Valley.
E. Richardson, Shenandoah & Allegheny.
A. Donaldson, Ohio & Mississippi.
L. A. Teal, Sioux City & Pacific.
J. McGray, Des Moines & Fort Dodge.
H. W. Eddy, Boston & Albany.
Geo. M. Colly, Boston & Albany.
Geo. A. Lowe, Chicago & Northwestern.
Jas. Bothwell, Chicago & Northwestern.
I. W. Stokes, Ohio & Mississippi.
R. M. Richardson, St. Louis, Iron Mountain & Southern.
Thos. Rennell, Memphis & Little Rock.
James Eblin, Little Rock & Fort Smith.
James Meacham.
S. W. Wakefield, Chicago, Rock Island & Pacific.

W. C. Maynes, Chicago & Eastern Illinois.
J. N. Hall, Louisville & Nashville.
L. C. Noble, Houston & Texas Central.
Pulaski Leeds, Louisville & Nashville.
L. R. Brooks, Lima Iron Co.
H. Tandy, Canadian Locomotive Works.
Nathan M. George, Danbury & Norwalk.
F. W. Mast, Louisville, Evansville & St. Louis.
T. B. Inness, Mt. Savage Locomotive Works.
R. O. Carscadin, Chicago, Rock Island & Pacific.
Chas. Blackwell, Norfolk & Western & Shenandoah.
C. A. Sandman, East St. Louis.
Geo. Dawne, Sidney, Australia.
H. P. Alcott, Atchison, Topeka & Santa Fe.
E. D. Anderson, Illinois Central.
Geo. A. Ferguson, Boston, Concord & Montreal.
W. McFarland, St. Paul & Duluth.
J. A. Millholland, Cumberland.
H. D. Jarrell.
Matt Ellis, Chicago, St. Paul, Minneapolis & Omaha.
W. L. Hoffecker, Pittsburgh & Western.
N. L. Davis.

H. Tresetts, New York, Lake Erie & Western.
S. H. Dotterer, Delaware & Hudson Canal.
W. Renshaw, Illinois Central.
C. Barkley Powell, California Southern.
F. M. Twombly, Chicago Central.
Ira Petris, Jacksonville & Southeastern.
President Wells then delivered his annual address, as follows:

PRESIDENT'S ADDRESS.

GENTLEMEN:—At your last annual convention you saw proper, much to my surprise, to elect me President of your Association. Not being present at that meeting, I take this, the first opportunity of returning my thanks to the members for the flattering compliment paid me on that occasion, and I trust that I fully appreciate it as such, and that you will accept my sincere thanks and my assurance that I shall try to discharge to the best of my ability the duties devolving upon the presiding officer of the present convention; and in my efforts I trust that I may have your assistance, and in matters wherein I fail your kind indulgence.

For the sixteenth time in the history of our Association we meet in annual convention under, perhaps, more flattering circumstances than at any previous period. From a mere beginning in less than half a century the railway interests have grown to their present enormous proportions—beginning, as it were, from almost nothing and growing and developing in that time to what we find them to-day.

Some of us began our railway experience more than a quarter of a century ago, when the railway was emerging, as it were, from its infancy; and the history of the railways of this country during this time is practically the history of our individual experience. Sixteen years ago this Association was organized. Six persons were at the first meeting. The object was to increase our knowledge by the experience of others; to investigate various matters of interest in our business not fully understood, and give the members the results of such investigations and the benefit of each other's experience, that we might in that way serve our several companies to better advantage and to their greater profit. To what extent we have succeeded in this during the past 16 years others, perhaps, are better able to judge than we. We still sometimes hear the question asked, what good has resulted to the railway interests from the meetings of this association? In answer to the question we may not be able to point directly to any considerable number of cases showing to what extent the roads have been benefited, yet I am confident that there are but few if any members who will not acknowledge their indebtedness to these meetings for many valuable ideas and suggestions brought out in reports, papers, questions discussed, and from the personal experience of members, given both in convention and in private.

The most valuable feature, perhaps, of our meetings is that they elicit discussion, in which all sides of a question are presented; they tend to induce conservatism in ideas by showing a man that it is possible that he may be riding a comparatively worthless hobby without being aware of it; they begot caution in the matter of new devices and untried things by evidence presented of the failure of others that at first gave equal promise of success; they cultivate and encourage that most valuable of all habits, the habit of wanting to know the why and wherefore in all cases, where it is not perfectly plain—not taking it for granted that a thing is, or will result, as represented, unless a reason can be given that the idea is practicable; they encourage the observance of the rule to investigate, so far as is possible, new devices and untried plans, before making practical tests—separating the chaff from the wheat. I suppose there are but few of us who cannot point to numerous instances where, if this rule had been observed, the companies making the trial would have saved both money and trouble—cases where failure was inevitable to the mind of any one of good judgment.

It seems to me that this Association has done a great deal for the railway interests, if it had done nothing more even than encourage and cultivate the habitual spirit of inquiry, criticism and investigation in the minds of its members; the desire to investigate and know the cause of all things not well understood in the mechanical department under our charge. By investigations positive knowledge is gained and the man is able to give a reason for his conclusions.

In this address I would merely call attention to a few matters which seem to me are worthy of some further consideration.

Greater perfection in the valve motion of late years, and the consequent use of the steam to better effect, has resulted in economy, but it is a question whether anything much further in that direction may be expected. Owing to frequent stops, the constantly varying power required, the varying speed at which the locomotive does its work and the narrow limits of time in which these changes occur, it may be considered impossible to design a valve motion that will be entirely perfect under all these conditions, more particularly so in the case of roads having a succession of ascending and descending grades. The "Joy valve gear," explained before you by the inventor, Mr. David Joy, at your last meeting, has been introduced to a limited extent in locomotives in this country, but with what success as compared with a good link motion I believe has not yet been fully determined. So far as the movement of the valve is concerned, the only difference seems to be that, when cutting off early in the stroke, the steam is used expansively to a slightly greater extent than occurs with the link motion; consequently, exhaust begins to that extent later in the stroke, other things being equal. Whether this feature is an advantage or a disadvantage under the conditions which a locomotive does the greater part of its work, I trust will be explained by some one able to give the facts to the convention. In many cases better proportions in the working parts of engines, as they are called, would insure greater durability; and adapting the size and the style of the engine more perfectly to suit the work to be done would result in economy.

Competition and reduction in rates have now made the greatest possible economy in the maintenance of equipment a necessity, and it is a question with all of us how can further reductions be made in the cost of renewals. At present

there seems to be no immediate prospect of a reduction in the cost of labor and materials, and it would seem then that further economy must result mainly from greater durability of the machinery and its more perfect adaptability to the amount and kind of work to be done, condition of track as to grades, speed, etc.; in other words, greater perfection in proportion where that is possible, and in the use of the best materials for the purpose; the weak parts made as substantial as the strongest; the wear of journals, bearings and sliding parts lessened by increasing the surfaces to ample proportions and thus reducing the pressure upon a given area as low as practicable, and the wear to a minimum; making the engine as near perfect as possible, and then getting the greatest mileage that is practicable out of it in a given time, so that a less number of engines will do the work. It is cheaper to make a mileage of 60,000 miles per year with one engine than to use two in making it. The wear and tear per mile is no greater for long runs than short ones. Aside from the time required to give the engine the necessary attention, it would be cheaper as regards cost per mile to run it continuously, until worn so as to necessitate going into the shop for general repairs.

Among the different parts of the locomotive that seem to me should receive some notice is the thickness of the piston in large cylinders. We began as far back as memory goes with 3-in. space between follower and flange for packing rings, or packing and "dead" rings, with the 10 and 12 in. cylinders then in use, and have increased to 20 or more inches in diameter, but as a rule have not materially increased the surface that carries the weight of the piston. Should not this thickness be increased somewhat in proportion to diameter in order to give the best results seems to me a question for inquiry.

The thickness of the flanges of the larger cylinders is another point that has not kept pace with the increase in the dimensions of the other parts. If a flange $1\frac{1}{2}$ in. thick was right for a 10 or 12 in. cylinder, it seems to have been taken for granted that it was also right for 18 and 20-in. cylinders; and the result has been that whenever an accident happens to the cylinder the flange is generally cracked or a piece of it broken out, often taking part of the cylinder with it. This in most cases would not occur if the flanges were of sufficient thickness, and the matter is, in my opinion, worthy of investigation.

As regards the wear of wheels and rail, it is a question whether a wider top to the rail would not add proportionately to the durability of these parts. Within a few years we have largely increased the weight on the wheels, in some cases nearly doubled it, but have not widened the rail—the only thing that can be done to increase the point of contact—and as a consequence we find the wear of both has been increased proportionally. If the part of the tread that now projects beyond the rail could also have a bearing on the rail and carry its proportion of the load, the durability of the wheel, as regards the natural wear of its face or tread, would be increased as much perhaps as 20 per cent., with a proportionate increase in the durability of the rail.

The best shape for the flange and tread of the wheel and for the inner edge of the rail are questions about which there is much diversity of opinion among those best informed on the subject. Scarcely any two wheel manufacturers make the shape of the flange and face of the wheel precisely alike, and there is equal variation in the curves of the edge of the rails against which the flanges have their bearing.

These matters, it seems to me, are of sufficient importance to warrant a thorough investigation. We ought to know whether any improvement can be made or whether the present variety is as good in practice as uniformity would be.

As regards diameter of the different sizes of chilled wheels in general use, there should be standards fixed for the diameter of the chills in which they are cast, so as to insure as far as possible a uniform diameter in wheels of a given size. Uniformity in pattern is very desirable and tends to promote economy. It may be possible, however, in the case of locomotives, to attach more importance to the subject of uniformity than the results will warrant.

It would not be considered profitable to use a four-horse team to haul one-horse loads, nor good policy to use four one-horse teams to haul four-horse loads. True economy, it seems to me, requires that the machinery be perfectly adapted to its work in size and pattern. The greater the number of cars hauled per train, the less will be the cost per car for train expenses; but if there are but few to haul at a time, the engine large enough to haul them at the required speed will be cheaper than one that is larger than necessary; but if the engine must be used for both heavy and light trains, it cannot then be a question as regards the lighter trains.

The water supply of boilers is a more important matter than is generally acknowledged. To procure it free from impurities, such as adhere to the heating surfaces in the form of scale, will warrant an original outlay of a large sum of money in the saving of boiler repairs and fuel in after years.

Bad water in the case of many roads results in the annual expenditure of large sums of money for repairs and fuel that would otherwise be saved. In the case of some of them there is, perhaps, no practicable remedy, while in others a judicious expenditure of money would greatly improve the average quality of the water and afford a large return in the reduction of repair and fuel bills.

The cost of fuel on a majority of roads is a large proportion in the operating expenses, and how to reduce it is a serious question. Many plans and devices have been tried from time to time for reducing the consumption, but so far we have made slow progress. Intelligence and close attention on the part of engineers and firemen is perhaps the best fuel-saver, supposing, of course, the engine to be well adapted to its work and the kind of coal used. It is a fact, however, that it is difficult to induce the men to give this matter the requisite attention; some do well, but many are entirely indifferent to it. Could engineers and firemen be induced to give close attention to this matter and exercise good judgment, I believe that as much as 10 per cent. of fuel could be saved, and at the same time the engines would do as much work and do it as well as at present. How to induce this attention and care is a difficult problem to solve. In matters requiring close and constant attention the natural tendency is to soon drop back into the old and easier method. It seems to be the inevitable result.

A brake, well adapted to freight engines and a good reliable brake for freight cars, automatic in action in case of the train breaking in two parts, and under the control of the engineer to apply at will and graduate as desired, is something greatly needed. A brake of this kind would enable faster time to be made; it would be the means of greater safety from accidents and would result in great economy in the wear of wheels, particularly on roads having numerous and heavy grades, where much damage results from wheels sliding by the use of the hand-brake. The difficulties, however, to be overcome in designing a brake perfect in action, and keeping it in good reliable working order, are seemingly insurmountable. To derive substantial benefits from a freight train brake, its adoption must be general, otherwise the mixing of foreign cars in trains, as now, would interfere greatly, if not entirely, with its usefulness. If such a brake can be perfected, and all roads adopt it and keep it in

good order on foreign cars in their possession as well as their own, it will result in great economy. Whether such a brake can be perfected, applicable to our present style of car, may be a question, but it is certainly to be desired.

It is with feelings of regret and sadness that I have to announce the deaths of three of our most prominent members since the meeting of the last convention, two of which were among my most intimate friends. These members have completed their work here, and now rest in the unseen world.

Mr. S. J. Hayes, who for nearly fifteen years and up to the time of his death was Treasurer of this Association, and whom we all knew and esteemed so highly, died in this city Sept. 21, 1882.

Mr. John E. Martin died in Chili, South America, several months ago, but the exact date of his decease I have not learned.

Mr. Howard Fry, Second Vice-President of this Association, whose sad and untimely death occurred April 27, 1883, was personally known to almost every member. Perhaps no similar event in the history of this Association has been so generally and deeply regretted. In the prime of life, in the midst of important and unfinished projects, well filling his position, and nearing the highest point attainable in his calling, he was suddenly taken away. It seems to us a great mystery.

I trust that the Association will take suitable action in regard to these deceased members expressive of the feelings of those present at the loss we have sustained.

The Secretary presented his annual report, of which we give the following summary:

SECRETARY'S REPORT.

"The membership of the Association is steadily on the increase. With two exceptions all decrease has been on account of names dropped for non-payment of dues, and these have been more than balanced by new members. Robert King, of Montgomery, having engaged in other business, has resigned, and H. A. Alden has also resigned. Fifteen members have been dropped from the rolls under our rules for the non-payment of dues. Twenty-four members have joined the Association. Since our last meeting death has again invaded our ranks and taken three of our most prominent members—Howard Fry, Second Vice-President, S. J. Hayes, Treasurer, and John E. Martin. With these changes the Association numbers 194 against for last year 188." Of the annual report 1,200 copies were printed, of which 689 have been sent to members or sold. Contributions from railroad companies and others to the printing fund amounted to \$463.75.

On Oct. 11 the Secretary took charge of the accounts of the late Treasurer, and has since acted as Treasurer, under instructions from the President.

The receipts were as follows:

Balance, June 19	\$514.22
Assessments received	778.00
Contributions to printing fund	463.75
Reports sold	19.07
Total	\$1,775.04
Disbursements as per vouchers	1,470.42

Balance, cash on hand.....\$304.62

The Boston fund was increased by interest received and by \$835.35 received from the Treasurer of last year's Entertainment Committee. The trustees bought \$1,100 in bonds at a cost of \$1,324.93. At present date the trustees hold \$4,800 in United States bonds and \$208.93 in cash.

The following question was submitted by Mr. H. N. Sprague: "Which is preferable, hot or cold water pressure, for testing boilers?"

Mr. SPRAGUE said that his idea had always been that the proper way to test anything was to test it under conditions similar to those under which it was expected to work. A boiler expanded by hot water would receive strains under conditions similar to those of actual practice, and he therefore believed that the hot water test was the proper test for boilers.

Mr. M. W. TOWNSEND said that he had tested boilers cold in the Woolwich Arsenal for the British Government, but he now tested them warm. Once every year he filled his boilers with water and made a light fire in the furnace, and by the expansion of the water he obtained the pressure required. He did not generate any steam. If he thought it necessary, he also went inside the boiler and examined it. He very seldom, if ever, used a pump in testing boilers.

Mr. RICHARD WILLIAMS (of the Patent Shaft & Axle Co., Limited, Wednesbury, England) said that in connection with his company's establishment were large boiler works, and testing boilers formed an important part of their business. No doubt, if it were practicable to apply fire for the testing, it would be advantageous, but the practice with them was to test the soundness of the boiler promptly and economically, and for that purpose hydraulic pressure was all that was necessary in testing a new boiler. They had found as the result of very many years' practice that if a boiler has stood successfully the hydraulic test, it will never afterwards be found imperfect while in use as a boiler.

Mr. SPRAGUE had found the hot water test cheapest. He filled the boiler through a compound injector and then ran it up to any pressure desired, usually testing with from 180 to 200 lbs. hot water pressure.

Mr. LYNE did not think that the hydrostatic test was a good test for boilers, especially old boilers. It proved but one thing, that the boiler was tight. It did not prove that the braces were properly placed; nor that things were in good order inside the boiler. It did not show whether or not the boiler would change its form. The Hartford Steam Boiler Inspection & Insurance Company, who had given much attention and time to this subject, did not apply the hydrostatic test unless they were requested to do so. They relied on a thorough inspection of the boiler inside and outside and on what they called the hammer test—that is, striking each part of the boiler lightly with a hammer. This best revealed any weaknesses, such as blisters or corrosion. He had known old boilers to be injured greatly by the application to them of the hydrostatic test. He believed that hot water was preferable to cold water for testing, because the strength of the iron increases as the temperature rises, up to about 520 degrees, at which point it is probably the strongest. As the temperature rises beyond that point the iron begins to weaken. The hydrostatic test should not be relied upon as conclusive, but in all cases a thorough examination inside and out should be made.

The regular order of business being taken up, the following paper, presented by Mr. F. W. Dean, was read by the Secretary.

REPORT ON IMPROVEMENTS IN LOCOMOTIVES.

GENTLEMEN:—Within the last five years the locomotive engine has received more attention, probably, than it had before since the time of its most rapid evolution—that is to say, since the time when the problem to be solved was to make a locomotive that would furnish steam for moderately fast and heavy traffic, and that would be certain enough in all particulars to make the conduct of a very important business sure. The locomotive has always been a uniquely fascinating machine to nearly all persons, from boyhood up, probably because it is a fast traveler, being more or

less associated with swift animals. This regard has, indeed, caused locomotives to be considered with more or less superstition, and we see them bearing the most extraordinary names, painted in the most inappropriate manner, and being the subjects of wonderful tales. The question of appearance often caused design to be sacrificed to it, and even to this day there are many locomotives running which indicate that there is not only some of the feeling referred to existing, but that the designers are not well versed in first-rate principles of machine design and constructive mechanical engineering. At least one road in this country can be pointed out on which many parts are fastened together with stud and tap bolts put in the most invisible and inaccessible places, giving the engine the appearance of being to some extent glued together. Not only this, but the amount of bright finish on the engines is absurdly great. Now I think that most of you will agree with me that this is all wrong. Nothing of the sort will be found on a Sellers, Bement, or Whitworth machine; and it would be difficult to say why a locomotive should be differently treated.

Some of the principles which should be kept in view in designing a locomotive are simplicity, directness, convenience in manufacturing, inspecting and repairing. A locomotive or other machine should be as smooth and free from projections of all sorts as possible, so long as these features are not inconsistent with the efficiency of the machine. In particular, all nuts and other parts should be conveniently placed, and no attempt should be made to conceal anything, for the minute this is done there enters what may aptly be termed mechanical immorality. The means which we employ to fasten parts together are the best we have and should be honestly used. The beauty of a machine consists largely in the propriety of the design, and any departure from propriety is a caricature.

The writer believes that sand boxes and dome covers should be perfectly smooth and without moldings. They should have hemispherical tops, and should flare out to join the boiler. In this particular Mr. Ely, the late Howard Fry and Mr. Lauder have set good examples.

The forms of cylinder casing should receive more attention. This should be entirely without moldings, should have flat ends, and the parts joined should be flush with each other. It would be well to consider whether, for the sake of simplicity at least, cylinder heads without casings cannot be used with advantage more than they are at present. If they were used in conjunction with solid web pistons, which will be noticed farther on, they could be made hollow, thus giving an air space for the non-conduction of heat. The objections to this construction are the cost of founding and the weight. On the other hand, the gain in strength due to this form, when the two webs are connected by ribs, may be an important advantage with the increasing steam pressures which are sure to follow the few leading instances of it which we now have.

Occasionally we hear of the burning of locomotive cabs. In England and on the continent of Europe, as most of us know, iron of a thickness of about $\frac{3}{8}$ in. is always used for a cab. The roof is sometimes made of wood, easily detachable from the sides and front, and is covered with some waterproof material. This overcomes the objection that an iron cab would be noisy in rainy weather, but the objection that it would be cold in winter and hot in summer may have considerable force. The weight of an iron cab would be an advantage in these days.

Having considered, therefore, matters relating mostly to the appearance of locomotives, I propose to treat in some detail certain parts of the American locomotive in order to see whether some improvement cannot be made in their efficiency.

The American locomotive is a remarkably wasteful machine, both in the use of the fuel and the use of the steam after it is generated. It is to be regretted that we have few if any records of a first-rate series of experiments to show just what our best locomotives are doing, and it is to be hoped that some of our leading railroad companies will soon employ thoroughly competent experts to make experiments on the matter. There is room for improvement none will doubt. There are locomotives burning as much as 95 pounds, and even more, of coal per square foot of grate area per hour, which is undoubtedly a very wasteful rate. To show how economical a locomotive can be, the writer has some figures which were furnished to him by Mr. Patrick Stirling, Locomotive Superintendent of the Great Northern Railway of England, giving the results of a series of experiments made by him with one of his 8 ft. 1 in. single pair of driving wheels locomotives, having cylinders 15 by 28 in. These experiments were undertaken for Mr. Wright, Chief Engineer of the British Navy, when the introduction of locomotive boilers into the English navy for torpedo boats was contemplated. They extended over a period of a month, and were during ordinary working. The following is an abstract of the results:

Distance traveled daily	152 miles
Weight of train, tender and engine	213 tons
Average speed per hour	50 miles
Fuel used per mile, including getting up steam	28 pounds
Fuel per indicated horse-power per hour	2.05 pounds
Pounds of water evaporated per pound of coal	9.88 pounds
Steam pressure per square inch	140 pounds

Comparing some of these figures with similar ones in this country there is a striking difference. The following seems to be representative in this country for a train of, say 350 tons, including the locomotive and tender, viz.:

Average speed per hour	35 miles
Fuel per mile	50 pounds
Fuel per I. H. P. per hour	44 pounds
Pounds of water evaporated per pound of fuel	6 to 7 pounds
Pounds of coal burnt per square foot of grate area per hour	110 pounds

The last three figures show an enormous waste of fuel in our locomotives, while those of the English engine show a performance nearly equal to the best stationary practice.

In seeking the cause of the great consumption of fuel in our locomotives we must recognize the fact that they are pushed frequently to their utmost capacity, and it is evident that the tremendous rapidity with which the combustion takes place is chiefly responsible for it. In stationary practice a consumption of more than 40 pounds of coal per square foot of grate area per hour is unusual, while in locomotives as much as 130 pounds is sometimes burnt. The chief cure for this evil is an increase of grate area, and this can be accomplished (while keeping the fire-box between the axles) by using a plate frame $\frac{1}{2}$ in. thick and the Joy valve gear, which allows the fire-box to be brought up close to the forward driving axle. In this way the width of a fire-box can be increased 5½ in. over the usual width with bar frames, and the length can be made 84 in., giving a grate 84 in. by 41 in., the area of which is 23.9 square feet, against 17.6 square feet, the amount usually found in locomotives with their driving axle centres 8 ft. 6 in. apart. This is a gain of 6.3 square feet, or almost 36 per cent. If, now, an engine with the smaller grate area should burn 100 pounds of coal per square foot of grate area per hour, a similar engine with the larger grate area, but burning the same total amount of fuel, would burn only about 75 pounds per foot of grate. The consequence of this slower rate of combustion would be that a larger exhaust nozzle could be used, less coal would be pulled through the tubes, fewer sparks would be sent out of the chimney; there would be less back

pressure in the cylinders and a considerable gain in economy would result.

The recent extensions of smoke-boxes to catch cinders seem to be a decided improvement, but this is attacking the problem at the wrong end. The combination of the deflector and brick arch are undoubtedly very efficient in promoting complete combustion and in retaining the particles of coal in the fire-box which would otherwise be taken along by the strong draught.

It appears to be a fact that enough air to support combustion cannot be admitted through the grate, and therefore it is advisable to run with the furnace door a little open in order to supply the deficiency. This air should be spread outward in all directions by the deflector, to meet the gases which are thrown forward by the arch. In order that this process may be most perfectly carried out, the door should have the hinges at the bottom, and it should open at the top, or if it opens at the side, which is more convenient, it should be in two parts, the upper part being hinged to the lower, and capable of turning back under a control of a latch. In this way a thin film of air can be admitted and both sides of the fire treated alike.

Great difficulty has been experienced in the maintenance of deflectors, on account of their rapidly burning out. The writer, however, believes that this can be completely overcome, if not by fire brick resting on water tubes, as described by Mr. Fry last year, by a water-space deflector, either cast whole (as steel castings are nowadays excellent) or made of boiler plate. The water-space could be made of any thickness, and circulation could be maintained by connecting the lower part of it, by means of pipes, to the coolest part of the fire-box water-space, and the upper part to the crown sheet. From experience on the Old Colony Railroad with steel water-space arches in place of brick arches, it may be anticipated that a deflector made as described, if provided with mud-plugs, would remain good an indefinite time.

The preceding considerations lead to the belief that there is ample opportunity to improve the American type of passenger locomotive, and that the advent of a departure from it is not necessarily near.

The frames of American locomotives not only cause the fire-box to be very narrow, but they have the disadvantage also of not possessing sufficient vertical stiffness to enable them to stand alone. They in consequence require somewhat rigid connection with the boiler, and cause it considerable harm as it expands and contracts. The only rigid, or approximately rigid, connection between the boiler and frame should be at the smoke-box, and the boiler should simply rest on the frames between the driving-wheels. The frame then becomes the pushing and pulling part of the machine, and the boiler is carried along only for the purpose of generating steam and giving weight, and is allowed perfect freedom to choose its position on the frame. This frame can be wholly made of 1 in. or 1½ in. plate, as in England, or it can be made of plate between the driving wheels and a bar 2 in. or 2½ in. by 8 in. or 10 in. forward of the driving-wheels, or, in fact it might be, in the latter part, of channel or T-iron. The T, or channel form, would be inconvenient, however, for the attachment of parts. Lateral stiffness can be effectively given to these thin frames by cross-bracing.

Much has been written in late years concerning the proper construction of boilers, and but little will be said here on this subject. The following are laid down, with brief argument, as general specifications of a first-class locomotive boiler.

1. Use butt joints with inside and outside covering plates, the circumferential covering plates being continuous welded hoops.
2. Punch the holes one-eighth inch small, and ream them to size when the plates are in place, or drill them in place. In either case counter-sink the holes slightly in order to give a fillet to the rivet head.
3. Rivet by machinery, preferably by the hydraulic system.
4. Place the screwed stays farther apart than usual, and cup their ends with a button sett.
5. Use a straight boiler with a Belpaire fire-box, as this form can be perfectly stayed.
6. Incline the fire-box top sheet toward the furnace door in order to give a wide water space and to allow the steam to escape easily.
7. Avoid overhang in the side plates of the inside fire-box, and instead of this incline them inward, securing a large number of tubes by flanging out the side sheets forward so as to join a wide tube plate. This is important, because an overhung plate forms an ineffective evaporating surface and impedes circulation.
8. Make the ash-pan strong and as tight as possible, in order that when running without working steam it may be closed to prevent combustion, thus doing away with the necessity of opening the furnace door and allowing cold air to blow on the plates.
9. Place the tubes in rows making 30 degrees with a horizontal line rather than 60 degrees, as the circulation is less impeded in the former, while nearly the same number of tubes can be got in as in the latter.
10. If the water is of good quality take it into the boiler by a pipe passing through the end of the boiler, and run the pipe so far forward that the water will be nearly or quite as hot as the steam before it is allowed to spread about.
11. Use no dome, but rather take steam through a perforated pipe, as it is dryer than dome steam, and the boiler is less likely to prime, while domes are a source of weakness and expense.

The writer is aware that the latter condition is opposed to the settled principles of most American practice, but he believes that the matter has not received the attention which it deserves. In England and on the continent of Europe many domeless locomotives are in use; for example, on the Great Northern Railway there are 750, on the Glasgow & Southwestern 280, and on the Southeastern 55 per cent. of the total number are domeless, and old locomotives are being converted as rapidly as possible.

It is generally assumed in this country that engines with domes work dryer steam and prime less than domeless engines; but the writer believes that these are mistakes, for, in the case of domed engines, where does steam get rid of its moisture, where does superheating take place, and is not steam in the dome farther from the hottest part of the boiler than steam in the top of the boiler? And furthermore, is not steam rapidly rushing to one point more likely to entrain water than steam passing quietly through holes in a pipe which extends the whole length of the boiler, the perforations ending three feet from each end? The steam capacity of a dome is of no advantage, as a domeful of steam is an insufficient quantity.

In addition to the possible changes in locomotives thus far mentioned, it is desirable to direct the attention of the members of the Association to some matters of smaller detail. For example, the ordinary coupling rod, connecting rod, cross-head and guide are not what they should be. A drawing of an improved form of connecting rod is herewith presented. Coupling rods with bushed eye ends are simple, cannot be tampered with, are beautiful to look at and have been known to run three years without renewal.

The four-bar guide which is so common is weak, expen

sive and is perfectly exposed to dust. This should give way to some other form; for example, to a cast-iron bored guide cast solid with the back cylinder head.

This is the most perfect form of guide and cross-head yet devised, because, among other things, the cylinder head can be turned in the machine which bores the guide, and at the same time, thus securing perfect alignment. When the opposite driving wheels are at different levels, it will allow the cross-head and piston to revolve, thus doing away with twisting the connecting rod, wear on the edge of the guide bars, and grooving of the bars and cylinders. Moreover, it allows the upper bearing guide surface, on which nearly all the wear takes place, to be wider than the lower, and it can be boxed in and protected from the dust. In a word, it possesses very valuable features.

Breakages of rock-shafts now and then occur, and the question arises whether it would not be an improvement to make them of gun iron or steel castings, larger in diameter than usual and hollow. In this way a better casting would be probable, and the metal would be better distributed, weight for weight, than in the ordinary form.

Solid pistons have the advantage of simplicity and cheapness. As they are almost exclusively used in England it would seem that they would be successful here if understood.

This Association has for a long time considered the matter of the best form and material for coupling-rods with somewhat satisfactory results. A rod made of solid drawn weldless steel tube would possess excellent qualities for this purpose. It would be strong, light, elastic and reasonably cheap. If one of these tubes $3\frac{1}{2}$ in. in outside diameter and $\frac{1}{2}$ in. thick be passed between rolls and flattened to a thickness of 2 in. and then welded to solid eye ends it would make a good rod, provided the welding could be well done. This rod would have a depth of about $4\frac{1}{2}$ in., and if 8 ft. 6 in. long would have a factor of safety of $3\frac{1}{2}$ in. when making 300 revolutions per minute, against $4\frac{1}{2}$ for the heaviest I-form used. This is rather small, but probably larger than that of many rods in use. The writer regrets to say that he is unable to find out the elastic limit, ultimate strength, elongation and contraction of area of this material, but he hopes to lay them before the Association at some other time.

The Joy valve gear seems to have well fulfilled its purpose, and the opinion among men best able to judge is that it is destined to supersede the Stephenson link. The supposed harmful effect of the rise and fall of the axle has no foundation in fact, and the performance of engines to which the gear is applied appears to be unusually good. Like all new things, its proper design is yet a problem, at least for American locomotives. The following official figures, giving the actual weights of a link motion and a Joy motion, as they were built for the same locomotive on one of our leading lines, are remarkable:

Total weight of link motion	1,651 $\frac{1}{2}$ lbs.
Total weight of Joy motion	828 $\frac{1}{2}$ lbs.
or almost exactly 2 to 1.	

Besides the cheapness of the gear, its accessibility, accuracy, the possibility of excluding dust from the wearing surfaces, the opportunity for increasing the grate area on account of the absence of eccentrics, its capability of allowing the steam to follow the piston nearly to the end of the stroke, its rapid opening and closing of the valve, the small area of frictional surfaces and the ease of handling, are excellent features.

This gear is now adopted in England by the London & Northwestern, the Midland, the Great Eastern and the Great Western Railways, which are among the half dozen most important lines in Great Britain, and on which the heaviest and most rapid traffic is conducted. It is also adopted by certain lines in English colonies, and it is to be hoped that its use will rapidly spread in this country.

In conclusion, the writer wishes to say that it has been his aim in this paper to draw attention to the fact that there are simple ways out of the dilemma in which master mechanics now find themselves when asked to draw heavy trains at very fast speeds, and to show that the present type of locomotive has not outlived its usefulness, as some inventors think, but is capable of considerable extensions in various desirable directions, all contributing to its cheapness, power, economy and durability.

F. W. DEAN.

Mr. SETCHEL discussed several of the points in Mr. Dean's paper. He did not favor the author's suggestion that locomotive cabs be made of iron. He did not see what advantage an iron cab could have. He thought it would be far less safe than the ordinary wooden cab. As to Mr. Dean's assertion that the American type of engine is a very wasteful machine, he thought that the slovenly way in which engines are fired in this country had more to do with the fact than their construction. As soon as the smoke begins to whiten it is an indication to our firemen that more coal is wanted and they throw in more. On the Cincinnati Southern, where very little attention had been paid to fuel, the firemen kept the black smoke rolling all the time. But by adopting the extended front end and disciplining the firemen they had since made a saving in fuel on that road of from 25 to 33 per cent. In England, he believed they were much more careful of their fuel than in this country. Mr. Joy had said at the last meeting that it was almost impossible to get up any device that would make a saving of fuel in England from the fact that already they seemed to have attained the acme of economy in that regard. He thought that our engines had to do more work than English engines. It was not the fact that they were inferior to the English engines, but they were subjected to more trying service, and tended with less regard to economy. He disagreed with Mr. Dean in regard to opening the doors. These should be kept shut. The fireman who has his door shut the soonest after the shovel is introduced gets the most steam. As to the water deflector, it had turned out to be a failure. A number of master mechanics had tried it, but had to discard it, simply because it could not be kept in. As a substitute they had put in the brick arch. He did not agree with Mr. Dean in the opinion that the slab frame was best, yet it might be desirable to use it in order to get a wider fire-box. One thing was certain, that most of our engine frames had not enough of depth to support them properly. To obviate that most builders put on heavy braces, which was wrong. The only rigid connection with the boiler, as Mr. Dean said, ought to be to the cylinder, and the boiler should be left free to expand and choose its own position on the frames, and the frames should be braced laterally. It was certainly a great mistake to brace boilers their whole length. Mr. Dean suggested that stay-bolts be placed further apart and capped. He believed it was the practice of nearly all builders to rivet over and cap their stay-bolts, and he thought they were put quite far enough apart. He rather thought they should be put nearer together. The suggestion as to a perforated pipe he thought was all wrong. He knew there was some truth in the statement that a dome of steam is of no value, but if a dome of steam can be kept ahead all the time it seemed to him that dryer steam would be obtained than would be possible with a perforated pipe. He agreed with Mr. Dean that the

guide bars ought to be heavier and wider. The Louisville & Nashville on its standard engine has a guide which runs the whole width. He was also of the same opinion as Mr. Dean in regard to the superiority of solid pistons and piston heads. There were many good things in the paper which he thought it would be well to adopt, and there were some things in it which he thought were wrong.

Mr. SPRAGUE did not approve of Mr. Dean's suggestion to do away with the moldings on the dome and sand box. He did not see why appearances should not be regarded to a certain extent, especially when it cost but a trifle.

Mr. SMITH thought Mr. Setchel took a wrong view of the practice of running with the door open. The custom on his road was to put one shovelful of coal into the fire-box and open the door one notch, about half an inch. They used a deflector and by that means threw a thin stream of air over the fire, thus preventing smoke.

Mr. GORDON said that he had just fitted up a set of head guides and the expense of fitting them up was certainly 50 per cent. more than that of fitting up an ordinary guide. He had no doubt that it would prove to be a very good working guide. The cross-head was very strong and there was a good wearing surface. It would perhaps be better to have the guide where the engineer could see it. He was careful to have the cross-head fitted very loose and slack. He used 8 bolts, bolting on the brackets on the side 10 in. through. The bolts were all turned and fitted nicely, which added a good deal to the expense.

Mr. BARNETT said that it was not true that a large proportion of the engines built in England were domeless, taking their steam through a perforated steam pipe; nor was it the practice in England to make the cabs of $\frac{3}{4}$ -in. iron. One-sixteenth is as thick as they use, with a wooden roof. As to the Joy valve gear, if it was the impression that that gear was being extensively adopted on English railways, he would say that the Great Western had it on one engine only, and that engine was not in every day use. The London & Northwestern had it on two engines and it was the purpose to apply it to ten others now constructing. With these large railways the gear was still in its experimental stage.

Mr. TAYLOR said that some of the engines on his road had the Jarrett water-table. Those engines were good steamers, but the trouble was to keep them tight. Another defect in them was that after the fuel passed over the water deflector it would invariably fill up between the deflector and tubes. He suggested to the boiler-maker to make another deflector and put it in there and cut it away from the flue sheet, so as to let the dirt pass down and the flame have a chance to pass up between the deflector and flue sheet. From this he invariably got a good result. He admitted, however, that he could not put those things in and maintain them if he had the sort of water to use that was used in the western country. Of 20 engines on his road having these deflectors, it would be impossible to find one that had ever had a rivet burned out or a crack in the sheet, excepting where there was a mechanical defect. He considered the water table more economical than the brick arch. He obtained as good results from the water table as from the brick arch from the fact that the fire has got to pass over it and down between the flue sheet and the arch, and the greater the distance the flame has to travel, the more heat goes through the sheets.

Mr. SMITH thought there was 10 per cent. economy in the brick arch. He based this statement upon experiments made with the same engine with the arch and without it.

Mr. SEDGLEY had been led by his experience to a different conclusion from that reached by Mr. Smith. He had found by experiment that the same engine gave as good results without the arch as with it, and while ten years ago the brick arch was used universally on his road, now out of 540 engines not one was equipped with it. His practice was to admit air just above the fire through hollow tubes. He thought that all who had had experience with a perforated pipe without a dome, would agree that in that section of the country it was not practicable to run them, the water being so impure that the pipe cannot be brought far enough from the water to prevent the priming of the engine from carrying too much into the cylinder. In New England, where the water was pure, it was practicable; but in his judgment it could not be done any better than with a dome. Where was the dryest steam obtained, near the water or far from it?

Mr. SMITH mentioned a statement he had seen in a leading mechanical paper to the effect that it was the daily practice on the London, Brighton & South Coast Railway to run a train 65 miles without putting any coal in the fire-box. They use the brick arch and the deflector. Such economy as that would be impossible without the brick arch.

Mr. FLYNN said that he had tried the brick arch, but did not find it economical. There might be some economy in its use where extraordinarily good coal was burned. He had built some tubular boilers shortly after the war and made them 9 inches wider and 10 inches higher than the old wagon-top boilers, which latter were always noticed for their hardness in getting steam. The engineer and fireman had to be very attentive in order to make the trip successfully. To his astonishment the engines with the boilers made as described became very perfect steamers, a result which he attributed to the enlarged steam reservoir. He disfavored the perforated steam pipe. The steam must be dryer the farther it is from the surface of the water. His experience corresponded with Mr. Sedgley's in regard to the use of the brick arch. He had found that the only way in which a saving was made by the use of the brick arch was in causing the enginemen to run with as shallow a fire as possible.

Mr. SMITH had not found any economy in the brick arch he had first put in, a fact owing, as he soon ascertained, to the accumulation of sparks in front of the arch. These he removed by a strong draft through the lower row of flues. The result was a saving of fuel.

Mr. LYNE, referring to the statement in Mr. Dean's paper that the settlement of the engine at the back end would not derange the movement of the Joy valve gear, said that he had found the contrary to be the case in an engine fitted with this gear which was running across the state of New Jersey. Another difficulty with this gear is that the lead does not increase, as it does with the link motion. Of course this gear is still in its infancy, but he thought it would be a long time before anything would be found to supersede the link. The perforated pipe is excellent on stationary boilers, but it is not a good thing for locomotives. While boiler pressures and engine loads had been increased, no steps had been taken to relieve the valve. At his suggestion, a combination of the Allen valve and the Richardson balancing device had been applied to an engine. After being in service 14 months, and running 44,169 miles without repairs, the engine went into the shop, and the valves were refaced, although they did not leak. Previous to that time the Allen valve, unbalanced, had to be faced every six weeks. Valves and cylinders ought to have a constant lubrication. It was well known that a small eccentric would wear better than a large one. The speaker had designed one that could be made solid or in halves, and turned down so as to leave about half an inch of stock on the outside of the axle. A collar with a flange upon it is put on the

shaft of the axle. This collar is keyed on the axle before the wheels are put under the engine. The eccentric is held up against the flange by two bolts, which go through the eccentric and the flange. With this arrangement no pressure is brought on the eccentric to distort it. The device is not patented.

Mr. TAYLOR said that in order to get rid of black smoke, it was the practice on his road to leave the furnace door open for two or three revolutions of the engine.

At this point the convention adjourned till the following day.

SECOND DAY.

The proceedings of the second day began with the presentation of the application of Mr. Angus Sinclair of the *American Machinist* for associate membership. Mr. Sinclair was subsequently elected an associate member.

On motion of Mr. Setchel, Mr. J. L. White, formerly of the Evansville & Terre Haute Railroad, was elected an honorary member.

The Committee on the Most Practicable and Best System of Paying Premiums to Engineers and Firemen to Induce Economy in Working Locomotives presented a report, which was accepted:

[We are compelled to defer the publication of this interesting report until next week.]

The Committee on Improvement in Boiler Construction presented its report, which was accepted.

(This report will be published hereafter.)

Mr. WILDER said that he was now building a number of passenger engines intended for burning anthracite coal. The fire-boxes are 120 in. long and 33 in. wide. In order to be able to get the fire-box over the back axle of the engine we have to slope it up, and we also slope the crown-sheet down. We use the ordinary crown-bars, and hold the crown-sheet and crown bars with rivets. The dome sets very nearly over the front end of the fire-box, near the flue-sheet. We are using a number of those engines for burning soft coal, and with a fire-box of that shape we get even more economical results than we do with the ordinary square fire-box.

Mr. SPRAGUE said that in the engines that he had been building he made the crown-sheets all in one piece, avoiding seams and running the crown-bars longitudinally on most boilers. Sometimes he stay-bolts them.

Mr. WILDER, in answer to a question from Mr. Lauder, said that for a long time they had had very little trouble with the water-tubes, but after two or three years' service he had found that the tubes began to fill up and they had had to put in plugs opposite to them. Whenever they washed out the boilers they took out the plugs and scraped the tubes.

The Committee on Smoke Stacks and Spark Arresters presented a report.

[The publication of this report is unavoidably postponed on account of the number of engravings accompanying it.]

The report was accepted, and it was agreed, on motion of Mr. Raymond, that the 115 drawings of spark-arresting devices which accompanied the report should be printed with it.

Mr. WILDER described the Groesbeck & Wright spark arrester, which he had been trying lately. This spark arrester has an extended smoke-box and a lower chamber, the bottom of which is held shut by a steam cylinder working with a crank. This chamber is filled with water. A deflector comes out just above the flues on the sheets. It runs down, and the deflector has a joint on the centre which can be raised and lowered to give the requisite amount of draft. No netting is used. All the sparks are precipitated into the water. A float warns the engineer when the depository is full. By moving a cock he can open the door at the bottom and all the sparks are washed out, and the door can be shut by the reverse action of the steam in the cylinder, and the chamber fills up again with water. So far, this device had proved to be the best thing of the kind he had ever seen. Where this spark arrester was used, the smoke coming from the engine had very rarely any color whatever.

Mr. SETCHEL said that they had on the Ohio & Mississippi road a pipe running along the side of the boiler with a funnel-shaped mouth coming down to the top of an auxiliary reservoir here, and also a valve hung upon hinges opening from the cab, and they are able to discharge the sparks either while running or at stations without throwing any on the engine; by opening the water valve first and then the spark valve, thus discharging the sparks very quickly, and very easily. It is the first of the kind that has been used, and it is not patented.

On motion of Mr. RAYMOND, it was agreed that a committee of seven should be appointed to continue the investigation of this subject, and to make experiments during the coming year with different devices.

Invitations were accepted by the Association to be present at a parade to take place in the Exposition inclosure on June 21, in honor of the old locomotives, and to witness the working of the Shaw engine. This ended the proceedings of the second day.

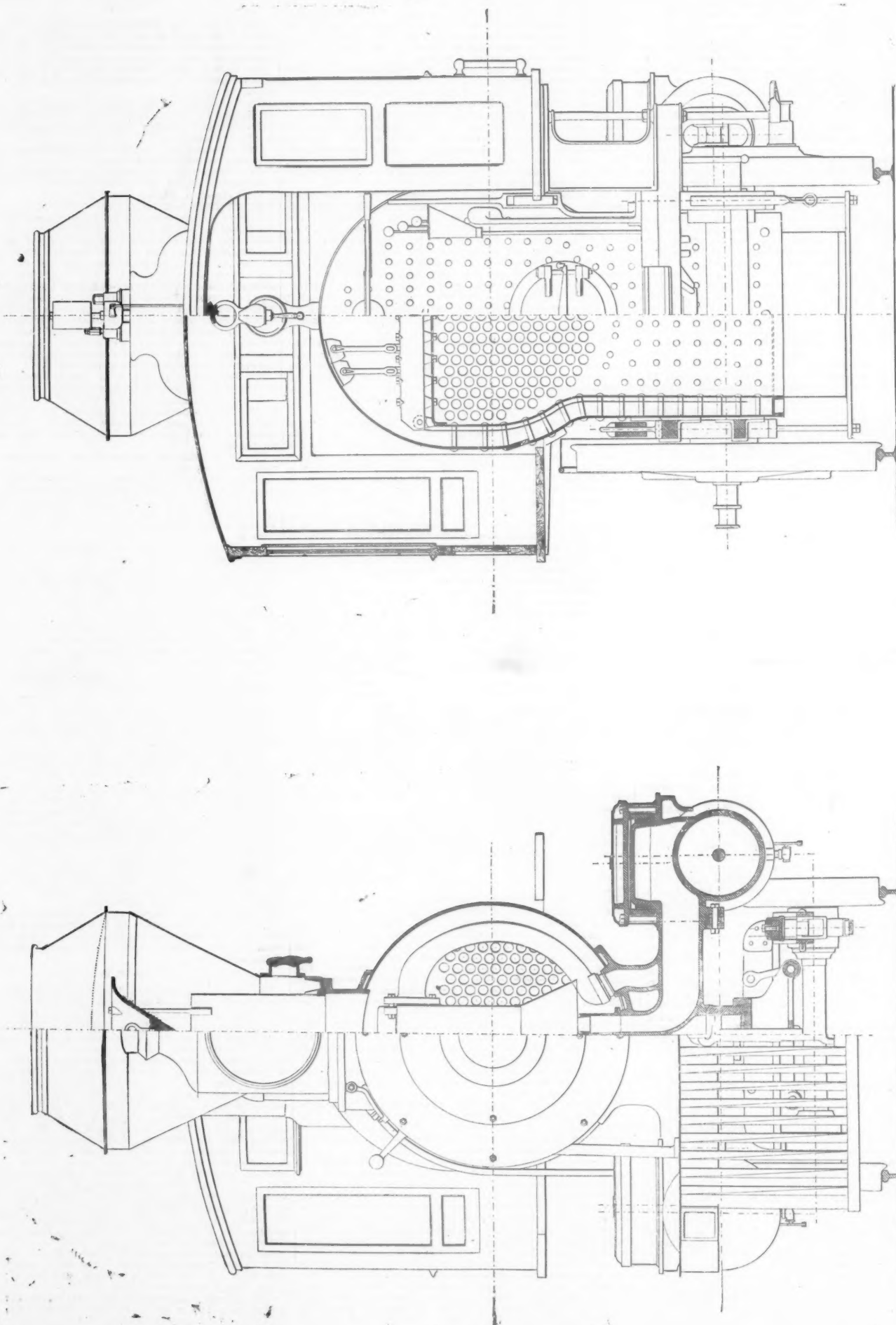
THIRD DAY.

The convention was called to order at the usual hour on the following day, and the President introduced Mr. B. JOY JEFFRIES, of Boston, who delivered an address on the subject of color blindness. Color blindness he defined as blindness to red and green. Violet-blind persons were so few that it was not worth while to consider them. A man who is red-blind is also green-blind, and vice versa. To such a person red or green is simply gray, and the darker the red or green the deeper the gray. About 4 per cent. of all the males in the world are color-blind. Among females color blindness is an exceedingly rare defect. From 3 to 5 per cent. of the employees on railroads are color-blind. The speaker described fully his method of detecting color blindness. A piece of worsted of a particular color is handed to the person examined, and he is asked to match it from an assortment of variously colored worsteds which is placed before him. There are different degrees of color blindness. A man may have this defect in such a degree as to unfit him for the position of engineer, while he may be able to perform the duties of a switchman or brakeman efficiently and safely. The Pennsylvania Railroad Co. is carrying out a system of examination for color blindness. The car carrying the expert goes over the road with the pay-car and the men are examined without being taken a minute from their work. A certificate is given to each man of his visual power, and a duplicate of it is kept by the company. The speaker earnestly advocated the establishment of a standard by state law or by the railroad corporations, of form and color perception—a standard of how good sight an engineer should have, a different standard for a brakeman, and a still lower standard for a man who only attends a gate. The whole subject was very thoroughly discussed by Mr. Jeffries, and on the conclusion of his address a vote of thanks was returned to him.

The report of the Committee on the Best Position for Check Valves was read by the Secretary and accepted.

[This report will be published hereafter.]

Mr. CASCADEN said that he had some few engines with the injector placed about in the middle of the boiler, half-way the



PASSENGER LOCOMOTIVE AT THE CHICAGO EXPOSITION.
Built by the BALDWIN LOCOMOTIVE WORKS, Philadelphia.

length of the flues. They gave him some trouble. He had to take the flues out, and found that the sediment had collected back close to the fire box, which caused them to leak. He replaced the flues and it was but a little while before he had to take them out again. He placed the check valves on the front end, with injector pipe just forward of the front flue-sheet, the pipe turning at a right angle and then back again into the flue-sheet, with the check outside. He found the result was good. The flues stopped leaking and I had no trouble whatever.

Mr. COLEMAN SELLERS read a paper on Standard Reamers for all Bolts used in Locomotive Work, the Proper Taper or Angle to Make them, and a System of Gauges to Correct and Maintain a Standard when Worn.

(This paper will be published hereafter.)

On motion of Mr. BLACK a vote of thanks was tendered to Mr. Sellers for his very able report.

The Committee to which was referred the question: Is the use of Metallic Packing for Piston Rods and Valve Stems Desirable? presented its report, which was accepted. [This report will be published hereafter.]

Mr. SETCHEL said that it might have been noticed that Mr. Fuller, of the New York, Pennsylvania & Ohio, states that the cost per year of packing with hemp is from \$25 to \$30. It seemed to him that that was too much. He made a test some years ago. He thought the total cost, using nothing but hemp, was \$3.07 for the whole year. They would notice that the cost of some of the metallic packing that had been spoken of, with the royalty, amounts to more than the hemp packing costs for the whole year, and then the cost of putting it in, which is much more, and then the cost of maintaining it, which in many cases is nearly equal to the cost of using hemp.

Mr. LYNE thought that metallic packing is the only proper packing to use on piston rods and valve stems. But it should be self-adjusting. If the water passes through, so much the better, but steam ought not to pass through.

Mr. LYNE then read a paper on the Use of the Indicator on Locomotives, which is given elsewhere. The discussion of this paper it was agreed to postpone until the next meeting.

The convention then proceeded to elect officers for the ensuing year. Each officer was balloted for in compliance with the provisions of the Constitution. Mr. Reuben Wells was re-elected President and Mr. James Sedgley First Vice-President. Mr. J. Davis Barnett was elected Second Vice-President and Mr. George Richards Treasurer. Mr. J. H. Setchel was re-elected Secretary. Mr. James Boon was re-elected a member of the Standing Committee on Subjects.

The Committee on Subjects submitted a report recommending the appointment of committees on the following subjects:

1. Improvement in Boiler Construction.
2. New Plans of Construction and Improvement in Locomotive Engines.
3. Smoke Stacks and Spark Arresters, to include Best form of Dome for Diamond Stack.
4. Shop Tools and Machinery.
5. Best Material for Construction of Locomotive, Truck and Tender Wheels.
6. Best practicable Mode of Educating Locomotive Engineers.
7. Balanced Valves.
8. Lubrication of Valves and Cylinders.

Long Branch was selected as the place for holding the next annual meeting.

The convention then adjourned until June 1, 1884, closing a successful and very interesting meeting.

Baldwin Passenger Locomotive at the Chicago Exposition.

We illustrate this week, on the inset and the accompanying pages, the second engine of the exhibit made at the Chicago Exposition by the Baldwin Locomotive Works in Philadelphia. It is a passenger engine with 17 by 24 in. cylinders and 62 in. drivers, the dimensions being as follows:

Kind of fuel used.....Bituminous coal

WEIGHT AND GENERAL DIMENSIONS.

Gauge of road.....	4 ft. 8½ in.
Total weight of locomotive in working order, including two men.....	(actual) 83,800 lbs.
Total weight of driving wheels.....	54,350 lbs.
Total wheel base.....	23 ft. 3¼ in.
Distance between centre of front and back driving wheels.....	8 ft. 6 in.
Distance from centre of main driving wheels to centre of cylinders.....	11 ft. 11¼ in.
Length of main connecting-rod, from centre to centre of journals.....	8 ft. 1½ in.
Traverse distance from the centre of one cylinder to the centre of the other.....	6 ft. 2 in.

CYLINDERS, VALVES, ETC.

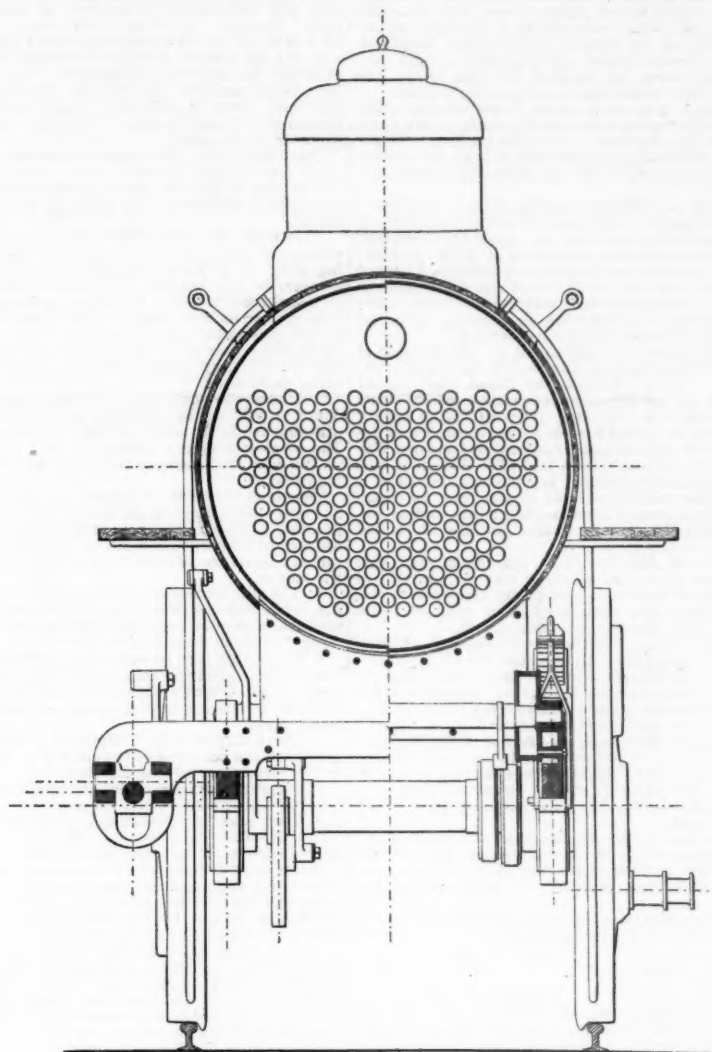
Diameter of cylinder and stroke of piston.....	17 in. × 24 in.
Horizontal thickness of piston over piston head and follower plate.....	4¾ in.
Kind of piston packing.....	Steam packing.
Diameter of piston rod.....	3 in.
Size of steam ports.....	16 in. × 1¼ in.
Size of exhaust ports.....	16 in. × 2¼ in.
Greatest travel of slide valves.....	5½ in.
Outside lap of slide valves.....	13-16 in.
Inside lap of slide valves.....	1-16 in.
Lead of slide valves in full stroke.....	1-32 in.
Throw of upper end of reverse lever from full gear forward to full gear backward, measured on the chord of the arc of its throw.....	3 ft. 4 in.
Sectional area of opening in each steam pipe connected with cylinders.....	15.9 sq. in.

WHEELS, ETC.

Diameter of driving wheels, outside of tires.....	62 in.
Diameter of truck wheels.....	28 in.
Size of main driving axle journal, diameter and length.....	7¼ in. × 8¼ in.
Size of other driving axle journals.....	7¼ in. × 8¼ in.
Size of truck axle journals.....	5 in. × 8¼ in.
Size of main crank-pin journals.....	4¼ in. × 4¼ in.
Size of coupling rod journals.....	3½ in. × 3½ in.
Length of driving springs, measured from centre to centre of hangers.....	3 ft. 2 in.

BOILER.

Description of boiler.....	Wagon top.
Inside diameter of smallest boiler ring.....	51 in.
Material of barrel of boiler.....	Iron.
Thickness of plates in barrel of boiler.....	¾ in.
Kind of horizontal seams.....	Lap seams, double riveted.
Kind of circumferential seams.....	Single riveted.
Material of tubes.....	Steel.
Number of tubes.....	196
Diameter of tubes, outside.....	2 in.
Distance between centres of tubes.....	2½ in.
Length of tubes, over tube plates.....	11 ft. 11¼ in.
Size of fire-box, inside, length × width × depth from under side of crown plate to bottom of mud ring.....	69 7-16 × 33¾ in. × 72 front.
Water spaces, sides, back and front of fire-box.....	¾ in. × 71 back.
Material of outside shell of fire-box.....	Iron.
Thickness of plates of outside shell of fire-box.....	¾ in.
Material of inside of fire-box.....	Steel.



Passenger Locomotive at the Chicago Exposition.

Thickness of plates in sides, back end and crown of fire-box.....	5-16 in. 5-16 in. ¾ in.
Material of tube plates.....	Iron front. Steel back.
Thickness of front and back tube-plates.....	¾ in. ¾ in.
How is crown-plate stayed, with girder or screw stay?.....	Girder.
Diameter and height of dome.....	32 in. × 30¼ in.
Maximum working steam pressure per square inch.....	130 lbs.
Kind of grate.....	Rocking.
Width of bars.....	1¼ in.
Width of opening between bars.....	¾ in.
Grate surface.....	16 sq. ft.
Heating surface in fire-box.....	117 sq. ft.
Heating surface of the inside of tubes.....	1,218 sq. ft.
Total heating surface.....	1,335 sq. ft.
Kind of blast nozzle, single or double.....	Double.
Diameter of blast nozzle.....	3¼ in.
Smallest inside diameter of chimney.....	15 in.
Height from top of rails to top of chimney.....	14 ft. 6¼ in.

TENDER.

Weight of tender, empty.....	(actual) 27,900 lbs.
Number of wheels under tender.....	Eight.
Diameter of tender wheels.....	33 in.
Size of journals of tender axles, diameter and length.....	3¾ in. × 7 in.
Total wheel-base of tender.....	14 ft. 5 in.
Distance from centre to centre of truck wheels of tender.....	53 in.
Water capacity of tank (in gallons of 231 cubic inches).....	2,800 galls.
Coal capacity of tender or fuel-bin.....	6,105 lbs.

ENGINE AND TENDER.

Total wheel-base of engine and tender.....	45 ft. 1¼ in.
Total length of engine and tender over all.....	54 ft. 6 in.

The engine is one of an order for the Northern Pacific road, and goes into service on that road at the close of the Exposition.

A Per Diem Charge for Freight Car Service.

At the annual convention of the American Society of Civil Engineers in St. Paul, last week, Mr. Wm. P. Shinn presented a paper entitled "How Can Railways Be Made More Efficient in the Transportation of Freight?" which is chiefly devoted to answering objections made to the proposition made in his previous paper, which we published recently, to substitute a *per diem* for the existing mileage charge for freight cars interchanged. This part of the paper we copy below:

The principal adverse discussion is upon my proposition of a *per diem* charge for freight cars when on foreign roads. I will here call attention to the fact that I do not suggest this plan as a panacea for all the evils that restrict car movement, but only as the best means for correcting the worst of those evils. My critics all agree that it is a great evil—and I may add a *growing* one—and that it should be remedied. They agree that something should be done, but do not approve of the *per diem* charge. Their objections are, briefly stated, as follows:

Mr. Chas. Paine, President American Society Civil Engineers, says:

1. A "demurrage" charge for detention of cars at stations or sidings is a success, but
2. Its collection cannot be entrusted to the Freight Department.

Mr. Paine's first proposition meets my approval—a reasonable demurrage charge must be made for cars unduly detained in loading and unloading, not only in the interest of the railroad company, but also for the encouragement and protection of those parties who do load and unload promptly, and who suffer in busy seasons when others detain cars unnecessarily. But his second proposition seems to me to be equivalent to saying that the officers and agents of the Freight Department of railways cannot be kept subordinate to the general management; that they cannot be made to carry out the policy decided upon. To this I cannot agree. That they have frequently occupied such a position, I admit; but that it is a necessity of the service, or that their assuming such a relation to the responsible management shows anything but a lack of fitness for the position, I cannot concede.

The arranging for and charging of a proper demurrage is a proper function of the commercial department, and that department can best assume and enforce it. A General Freight Agent who cannot or will not needs an immediate successor.

3. Mr. Paine admits that "the detention of cars on foreign roads is one of the great evils of our railway system," but "cannot agree that the *per diem* charge for cars when on foreign roads would be a success."

The fact that "it was once tried for a few weeks" Mr. Paine would scarcely rely upon as demonstrating its impracticability. What wholly new thing ever achieved success in its first few weeks' trial?

Did the locomotive with its rack and pinion, its "grass-hopper legs," *et id genus omne*? Was the telegraph or the telephone, the electric light, or the Bessemer converter?

Per contra, the letters of Mr. E. P. Vining, attached hereto as Appendix D., show that the plan was in operation between the Chicago, Burlington & Quincy Railroad and the Union Pacific Railway for two years, and that it gave satisfaction and was only abandoned because other companies did not adopt it, and those companies did not desire to keep up two systems.

The reasons assigned by Mr. Paine for the alleged impracticability are partly due to bad management or lack of management, which should be removed or improved as a condition precedent to the success of any scheme for increasing efficiency, and they are partly of such an accidental or infrequent occurrence as to need a special rule or exception to govern them.

The snow-storm or flood which Mr. Paine pictures as raging at the terminus may and will as frequently operate on the long and intermediate lines as on the short and terminal roads.

Blockades, except from some natural and extraordinary obstruction, need not and should not occur. While they do occur, they demonstrate that cars are in excess of other facilities; when cars are idle because they are not needed, they should be at home, and not on some foreign railroad waiting for traffic.

It will need some looking ahead, both to avoid blockades of loaded cars and to avoid getting many empty foreign cars on hand, but it is worthy of note that the cost to any company will be, not the whole sum it pays for other companies' cars, but that sum *minus* what it receives from other companies for the use of its own cars.

4. Mr. Paine expresses the opinion that the remedy for the evil is "a clearing-house, to which all roads shall report, and which should have authority to order the movement of cars which are not detained for good cause." The principal objection to a "clearing-house" is the extent of the country; it

would take a week to get a report from the Pacific coast, and two or three days to get reports from other extremes of the country; the situation would be so changed before the clearing-house got its reports digested that its efforts would generally be anticipated, and the cars ordered forward would have taken up another location before the order to move them would reach the parties in fault.

The great point to gain is to make it the interest of the companies to handle foreign cars rapidly and to return them promptly, and it will be done. A dollar paid out directly counts for more with many superintendents than five dollars paid or lost indirectly, that does not distinctly appear on a voucher.

Viewing, as I do, most freight car blockades as indicating a lack in administrative methods, either from inability to discern what particular facilities are needed or from lack of capacity to systematize the movement of traffic and correlate its movement with the receipt and delivery, I cannot consent to regard any objection based upon frequent or chronic blockades from other than unforeseen natural causes as worthy of serious consideration in deciding upon the merits of any plan of settlement for car service.

When, in 1863, the writer was called to the position of Superintendent of the Eastern Division of the Pittsburgh, Fort Wayne & Chicago Railway, he found local freight blockades to be of weekly occurrence, and nearly every Sunday was occupied in "clearing the road" of its weekly accumulation; but he looked for the cause, located and remedied it, and with no particular addition to facilities, but by a systematic use of what they had, the difficulty was wholly removed within a month. But the occurrence of a blockade, when the result of natural causes, can be much mitigated by prompt notice to connecting roads, and an immediate suspension of receipt of freight for the blocked line.

Mr. O. Chanute, M. Am. Soc. C. E., presents a very able discussion of my paper, to which I respond, partly in answer to his objections to criticisms of my expressed views, and partly in compliance with his formal demand for a concrete plan of enforcing the *per diem* charge.

Mr. Chanute queries: "Whether the diminished average mileage obtained from cars is an unmixed evil?"

Probably not. So imperfect are our best plans, and so deficient are our most earnest efforts, that perfection is not to be expected in this any more than in other directions.

But to "do not evil that good may come" is as applicable to physics as to ethics, and we are not called upon to perpetuate an evil, nor should we defend it, merely because good grows out of it. Mr. Chanute raises several points of possibly existing advantages, growing out of the decreased movement, but admits that they are only hypotheses, and may not really exist.

I might assume that what Mr. Chanute will not assert I am not called upon to deny, but I will consider them as fair hypotheses, and try to show that even if they do, in a measure, exist, they do not warrant a continuance of the system.

Taking first the comparison in empty car mileage on the Pittsburgh, Fort Wayne & Chicago Railway:

In 1868, loaded, 82.6	empty, 17.4 per cent.
" 1881, " 86.8	" 13.2 "

Increase . . . 4.2 Decrease 4.2 "

The increase in loaded mileage from 82.6 to 86.8 per cent. is 5 per cent. of the 1868 mileage, while the decrease in car mileage from 47.67 to 37.72 miles per day is 21 per cent.; and this in the face of longer runs for the cars in 1881. Certainly an increased loading of 5 per cent. cannot justify a decreased movement of 21 per cent.

"Again," Mr. Chanute says, "the accommodation of customers is (or should be) the primary object with railroad managers."

I venture the opinion that they do not so understand it.

The "primary object" with railway managers is the production of net earnings. This can best be accomplished by extending reasonable accommodation to customers.

If customers prefer to pay for keeping cars idle, then railway companies can afford to keep a surplus of cars for that purpose; but that cannot be properly termed "accommodation of customers" which keeps cars lying empty at one customer's siding or warehouse, while another cannot get cars at all.

I know of a case where a "customer" is "accommodated," but scarcely to the benefit of the railway company.

Having occasion some months since to visit a manufacturing establishment which uses perhaps ten cars of coal per month, and produces ten to twelve cars of product, I noticed a car being loaded with *débris*, to be unloaded a short distance from the works. The loading of a car took about three days, and when I asked if the railway company allowed its cars to be so used (for the load did not go on its line at all), the manager said, "Oh, I only load this car once, and then I take another;" but the result is he uses one railway company's car (not always the same company) all the time, and pays nothing for its use and does no repairs.

I do not think there has been any such general change in the manner of doing business as Mr. Chanute suggests; certainly no railway company, when business is brisk, sends its cars to a mill, to be detained there "while waiting for shipping orders." The mill proprietors are fortunate if at such times they can get cars to fill the orders on hand.

Goods are not loaded until their destination is known, and manufacturers cannot know whose cars to order until they know to what point they desire to ship.

A reasonable allowance of time for loading, unloading, switching, making up trains, etc., is of course to be made, but there must be a limit.

The average schedule speed of freight trains over each division, or from yard to yard, is probably not less than 10 miles per hour, equal to 240 miles per day.

The "average haul" of freight in the Union Line cars in 1881 was 692 miles nearly, always without transfer. This at 10 miles per hour would occupy 69.2 hours, but at the average miles run by Union Line cars in 1881, of 53.64 per day, or 2,235 miles per hour, it required 309.6 hours average for each car to be loaded, run 692 miles and unloaded.

Now	309.6 hours = 12.90 days.
69.2 "	" = 2.47 "

Difference . . . 240.4 " = 10.43 "

which shows that each Union Line car stood still on an average 10.43 days between each two average runs of 2.47 days, or, in other words, that it was running but one day out of each 5.32 secular days.

The average haul of freight on the Pittsburgh, Fort Wayne & Chicago Railroad in 1881 was 217.63 miles, requiring, at 10 miles an hour, 21.76 hours, or 0.90.

The average miles run by cars, 37.72 per day, gives 5.75 days to run 217.63 miles, so that each car averaged a movement of 0.90 days in each 5.75 days, or one day in each 5.34 secular days. The year 1881 was a season of active movement and great demand for cars. Will any one claim that this amount of "accommodation" is either justifiable or remunerative?

The importance of reducing empty car mileage to a mini-

mum, while it was not specifically mentioned in my paper, was not overlooked. I referred to the "more general back loading of cars" as one of the means by which the increased efficiency noted had been reached, and did not refer to it further because that point is very generally understood and admitted. I agree with all that Mr. Chanute says in regard to its importance, and also to his views of the benefit of a comprehensive warehousing system at terminal points, to operate for other traffic as elevators do for grain.

Considering next Mr. Chanute's criticisms on the proposed "*per diem* charge" in their order, many of his objections will be seen to have no adequate foundation, as my plan, hereinafter submitted, fully provides for or wholly avoids them.

1. It may, at first, lead to considerable increase in mileage of empty cars; but that is not likely to be its working after it is fully understood, and it does not follow necessarily that because a car is returned empty by the terminal road, that the next road, having a long haul, will haul it over its line empty. Nor will the terminal road return cars empty when there is an active demand for cars on its line. Increased movement may be desirable when cars do not carry loads, if thereby the cars are enabled to carry more loads.

2. Under the plan which I shall hereinafter present in detail, it will not be necessary to "follow the car over the different roads, so as to afford any check to its owner." The owning company gets paid, at the *per diem* rate, for all the days that each car is absent, and it knows just how long that is.

The check which Mr. Chanute says the owning road now has upon the mileage of its cars, i. e., by its billing, is in practice no check whatever, as the roads do not report the mileage of each car individually, but simply the aggregate mileage made by all cars of each company's ownership for the month.

3. The anticipated increase in expense to which Mr. Chanute refers will not be realized; the clerical labor will not be materially greater than that now required, and a "clearing-house" will not be necessary.

4. Opposition is to be expected, particularly "from those roads which profit by the imperfections of the present system," as Mr. Chanute expresses it; such opposition will be futile if the leading railway companies see their account in its adoption.

5. There may be some "temporary confusion" in consequence of the adoption of the change proposed, but it need not be serious nor of long duration.

The questions arising out of the receiving road being temporarily blocked should be provided for by a general rule; the making of pretenses, such as "bad order," upon which to refuse cars, will be like other flimsy pretenses, short-lived and of no importance in the long run.

When a car is destroyed on a foreign road the only equitable way for the company destroying it is to pay its equitable value and the *per diem* charge for a specific time sufficient for it to be rebuilt by the owning company. A company does not want its cars to be rebuilt by a foreign company.

Companies having a haul so short that they can take cars to destination, unload and return them in less than a day will be an exception, and when such a case exists, with a traffic of any magnitude, the charge for cars can and should be provided for by a special agreement.

6. In the discussion of the rate *per diem* to be charged under my plan Mr. Chanute arrives at the conclusion that "A *per diem* charge of 25 or 30 cents a day would be a fair one all around in the general exchange of business," and adopts as his basis the average cost of maintenance (covering current repairs, renewals to cover depreciation, and rebuilding of cars to keep the number good), plus the interest on the cost of the cars, and figures these items to amount per annum to:

On New York, Lake Erie & Western Railroad	\$79.42
On Pennsylvania Railroad	102.01
Or per day	$\frac{79.42}{365} = 22$ cents, and $\frac{102.01}{365} = 28$ cents.

My proposition was to charge only for business days, say 310 per annum, which would make the *per diem* rate on his basis $\frac{79.42}{310} = 25.6$ cents; $\frac{102.01}{310} = 32.9$ cents.

I must enter my objections to this result as follows:

a. To the figures for cost of maintenance. That given for the New York, Lake Erie & Western Railroad of \$40.92 per annum would require a freight car costing \$550 to last equivalent to 13.44 years without any charge for current repairs, as it would require 13.44 times \$40.92 to pay for its simple renewal.

While I do not question the accuracy of Mr. Chanute's statement that \$40.92 was the average expense incurred by the New York, Lake Erie & Western Railroad for repairs of freight cars during the last five years, it must have been based upon a number of cars many of which have been built new within the last five years, and proportionately few of which were five years old at the beginning of that term.

It is well known that during the first two or three years the repairs to a car are nearly nil, but that after five years' use they increase very rapidly.

From the data at my command I would estimate the cost of maintenance as at least \$75 per car per annum, which, with 7 per cent. interest, \$98.50, would make \$113.50 per annum, and 36.61 cents per day as the rate that would be chargeable upon Mr. Chanute's basis.

b. But I cannot concede the basis as at all correct, nor that it is fair and equitable in any sense. It obtains in no other business of which I have any knowledge.

Its adoption by a manufacturer would oblige him to assume all the risks of the business, without charge to his customer.

A railway company adopting it would be obliged to loan its cars in the busy season, when they were all needed on its own line, at a bare "cost of maintenance and interest" basis, and when the dull season came to keep its surplus cars at home at its own cost. If the active season was for six months in the year, it would receive for its average "outage" of cars during that season one-half their "cost of maintenance and interest" and pay the other half itself, for the poor privilege of having its cars ready to loan to its improvident neighbors during the next busy season.

Such a course would be a direct encouragement to the improvident roads to remain so, for why build or buy cars to pay "cost of maintenance and interest" on all the year, when they can borrow them when they are needed, and pay "cost of maintenance and interest" only while they choose to keep them?

The primary object in adopting the *per diem* plan is two-fold:

First—To make it the interest of every company to own equipment sufficient for its needs; and

Second—To make it the interest of every company to handle its cars rapidly and to return foreign cars promptly.

I recognize the propriety of Mr. Chanute's demand for a detailed and specific plan for charging, accounting and collecting the *per diem* charge, and will set it forth in this paper.

It might be inferred from the foregoing that it was the

movement of cars only that was sought to be expedited, but my proposed reform applies more forcibly to loaded than to empty cars.

In the letter of Mr. E. P. Vining, Freight Traffic Manager Union Pacific Railway Company, published in the April *Transactions*, attention is called to the unnecessarily slow and altogether uncertain movement of freight, and particularly where he says: "It is curious to observe that just at the times when the demand for transportation is most active the movement of freight becomes the slowest." This cannot be accounted for upon Mr. Chanute's hypothesis that the decreased speed is due to cars being delayed for loading or to accommodate the shippers. On the contrary, it is a source of great inconvenience and of material cost to shippers and consignees that freight is so long in transit. On articles worth \$100 per ton the interest charge at 6 per cent. is one-tenth of a cent per 100 lbs. for each secular day. The loss in interest from time lost in transit amounts to an enormous sum annually.

I would call attention, while upon this subject, to Mr. Vining's letter of Jan. 20, 1883 (Appendix B), in which he says: "If some officer were appointed whose duty it was to keep an accurate statement as to the length of time that such shipment was in transit, and if this statement were properly brought to the attention of the managing officers of the roads, I believe that many delays that now occur simply through the inefficiency and carelessness of the lower grades of employes, who now work, practically, without supervision from any higher officer, would be remedied." I agree with Mr. Vining that much of the work, under the general head of "dispatching" of cars, is done by subordinates, without any adequate supervision.

I cut from the daily newspaper a few days since the following Associated Press telegram:

"SAN FRANCISCO, Cal., May 21.—Freights from New York May 5 via New Orleans were ready for delivery here at noon to-day. The Southern Pacific has promised to keep the time up. A freight train consisting of 24 cars, from New York, arrived to-day over the Central Pacific road, the cars having been all the way from 25 to 40 days on the journey."

The all-rail distance from New York to San Francisco is approximately 3,400 miles, and the time named as 25 to 40 days indicates the speed as from 85 to 126 miles per day, or an average of 3.54 to 5.5 miles per hour.

The distance via New Orleans is:

From New York to New Orleans by water	2,045 miles.
" New Orleans to San Francisco by rail	2,485 "

Total 4,530 miles.

and the time, 16 days, allowing only 12 hours for transfer from boat to cars at New Orleans, averages 293 miles per day, or 12.2 miles per hour.

Thus is the old fable of the hare and tortoise practically exemplified.

One of the best, although indirect, results of the *per diem* system herein advocated would be that thereby a habit of prompt forwarding of cars would be cultivated, and as man is a creature of habit, the benefit would extend to all the cars handled by the companies adopting it.

The systematic making-up of trains with regard to the destinations of cars, their prompt dispatching when made up, having schedules so arranged that trains can ordinarily be kept "on time," making prompt and regular connections at the division termini, making prompt delivery to connecting railways—these are all requisite to the making of a fair and regular rate of speed, and they are all *practical* and *practicable*. A great cause of delay upon many railways is the making of schedules that trains cannot usually and habitually conform to. It is far better to have a slow schedule, and make it, than to have a fast one and generally fail to make it.

A subordinate official of a prominent line of railway recently said to me in substance as follows:

"There is a great lack of co-ordination between the various officials having the transportation interests in charge."

"The officer controlling the distribution of cars realizes his inability to supply the demand, and he urges that more cars be built."

"The Division Superintendent protests against more cars, saying that he cannot haul the cars he has; his need is more locomotives."

"The General Superintendent, finding trains delayed by other trains, is anxious to secure more main tracks."

"The general or terminal agent objects to more locomotives, cars or main tracks until his yard and station tracks and warehouses are brought up to the capacity of promptly handling the traffic that reaches him; while the General Manager, who should sift and determine what is most needed to harmonize these conflicting views, is apt to be mainly concerned in securing more traffic, or increasing his 'share in the pool,' and the subordinate officers are left to 'fight it out.'"

It requires careful, systematic and continual study of all the elements of the problem to properly diagnose the disease, and the proper remedy can only follow a correct diagnosis. The question was asked by Mr. T. C. Clark, M. Am. Soc. C. E.: "What is the basis of compensation for use of foreign cars in Great Britain?"

By the courtesy of Mr. James Dredge, editor of *Engineering*, and of Mr. P. W. Dawson, Secretary of the Railway Clearing House of Great Britain, I am enabled to present, as Appendix C, a full statement of their regulations and rates for car service.

It will be seen that they charge a mileage rate, varying as to distance and as to kind of cars, with an allowance of time for each distance, after which a demurrage charge is made for the excess of time on a *per diem* basis.

The mileage rates in United States currency are as follows (at \$4.84 to the pound):

DISTANCES.	Box wagons, bread vans and double sheep vans.	Open wagons not less than 11 ft 6 in. long, 4 ft 6 in. high, timber wagons.	Open wagons less than 11 ft 6 in. on floor inside.	Sheets.
63 miles or less.	Cents. 1.344	Cents. 1.008	Cents. 0.672	Cents. 0.336
63 to 85 miles.	1.210	0.908	0.605	0.302
86 to 128 miles.	1.075	0.807	0.537	0.268
129 to 163 miles.	0.941	0.706	0.470	0.235
164 to 233 miles.	0.807	0.605	0.403	0.202
234 and upwards.	0.665	0.453	0.302	0.151

The "sheets" referred to are the canvas covers or "tar-paulins" with which the goods loaded in open "wagons" are covered, and what strikes an American as most singular, next to the use of open wagons and sheets, is the fact

It is, so far as I am aware, the first attempt to formulate a plan for the *per diem* charge, the adoption of which in this country in whole as herein outlined, or in part as used in

For FORM 6, see example given in paper.

shall, under no circumstances, be allowed.



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EDITORIAL ANNOUNCEMENTS.

Passes.—All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.

Addresses.—Business letters should be addressed and drafts made payable to THE RAILROAD GAZETTE. Communications for the attention of the Editors should be addressed EDITOR RAILROAD GAZETTE.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

A TIME BASIS OF PAYMENT FOR USE OF CARS.

The better utilization of freight cars is the chief subject of the paper by Mr. Wm. P. Shinn, which we publish this week, and which is a continuation of his previous paper "On the Increased Efficiency of Railways for Transportation of Freight," which, with the discussions of it, we have published recently. The earlier paper was in the main historical, endeavoring to state the course of a great improvement in transportation which had already taken place. It was of a kind not often found in the transactions of engineering societies or elsewhere, concerned chiefly with improvements in management, to which more than to steel rails or any other one improvement of road or rolling stock the great reduction in the cost of transportation by rail of late years has been due. So great a change deserved chronicling, and in Mr. Shinn it has found an able chronicler.

In this paper Mr. Shinn suggested, as likely to have considerable effect in further increasing the efficiency of the railroads, the substitution of a payment per day for the present payment per mile for the use of freight cars interchanged between connecting roads. This proposition, which is not a new one, was referred to as likely to be impracticable by leading members of the Society of Civil Engineers who discussed Mr. Shinn's first paper, and the one which we publish this week is mostly devoted to answering these objections and presenting a definite plan for substituting *per diem* for mileage charges. If this paper should result in the general adoption of a practicable plan of payment per day, it would probably cause an economy in the capital invested in freight cars amounting to many millions of dollars, and also considerably increase the effectiveness of sidings, yards and stations, which are blocked by cars standing still more than by great activity in freight traffic. It is certain that if a company had to pay for foreign cars in proportion to the time it had them in its possession, they would be moved much more promptly, and so a smaller stock of cars would suffice.

In 1878 Mr. J. T. Rigney, of the Baltimore & Ohio

Railroad, proposed at the Car Accountants' Convention that the payment for foreign cars thereafter be made on a time instead of a mileage basis, and the following year he presented to the same body a paper (published in the *Railroad Gazette* of May 2, 1879, page 236) in which he advocated this change at some length, and illustrated its probable effect. In this he claimed that the freight equipment of the country would gain 25 per cent. in effectiveness by the change. If this were so, it would be equivalent to an addition of 162,000 to the stock of freight cars reported a year ago in *Poor's Manual*, and would in time save the addition of that number, worth more than \$80,000,000. This may be an exaggerated estimate, but when we see the very long average time that cars are absent on the average over some through routes of heavy traffic, it seems easy to increase the service of the cars employed on these routes by much more than 25 per cent.

Objections are made to a time basis of payment by managers whose opinions carry great weight, as likely to work badly in many cases and as impracticable to carry out.

As to the practicability of the plan, that has been abundantly proved by the experience for thirty years or more of the great and complex railroad system of the German Railroad Union, including all the railroads of Germany, Austria and Hungary, and some of those of adjacent countries. These railroads have many interchanges, though not comparable with those of the trunk lines with their Western connections, or of the latter with the roads west of them. The basis of their charges for car service is duplex—a fixed charge per day and also a charge per mile. But the time for running a given distance and for loading and unloading is limited, and if exceeded, the charge per day becomes three marks for the excess instead of one mark; that is, the company which holds a car an unreasonable length of time is virtually fined half a dollar a day for it. By these regulations, a car sent from New York to Chicago with a load would be allowed 12 days to make the run and two days for unloading at destination. No charge would be made for one of the unloading days, but for the other 13 there would be a time rent of a mark about 24 cents) per day, besides a change of a hundredth of a mark per kilometre. If the entire 14 days were used, then the car rent would amount to \$6.90, which is equivalent to 0.72 cent per mile, while the current charge of our roads is 0.75 cent—almost the same. But for every day less than 14 which should be occupied, 24 cents less would be paid, and if the trip were accomplished in a week, instead of 14 days, then the rent would amount to \$5.20 instead of \$6.90. If, however, the car should be kept more than 14 days, then 72 cents per day would be paid for every day of delay beyond that time, and if the time were 21 days, the charge for car hire would be \$11.94, against \$6.90 for 14 days and \$5.20 for seven, with the same mileage (960 miles). It is evident that with such regulations great effort will be made to keep the car within the regulation time, so as to avoid paying the 48 cents a day additional charge, which is in the nature of a fine, and considerable effort to finish the work in less than the regulation time, by which 24 cents a day would be saved.

A tolerably minute account of the German regulations, based on the official regulations, was published in the *Railroad Gazette* of April 11, 1879. It contains provisions for accidents, etc., and must certainly be a practicable system, because it has been practiced with success for many years. That it would be a cheap and simple system we are not prepared to affirm. Clerks are cheap in Germany, and any organization there is likely to require what seems to us an inordinate number of men and documents. It is hard to believe, however, that it will not be possible to plan some efficient method of regulating and accounting for interchanges on a time basis.

The greatest obstacle to the introduction of such a change in methods, however, is the great difficulty of securing unanimous action, the lack of a central representative party, like the German Railroad Union, to plan and execute those measures in which the co-operation of the different companies is required. For this is not a change which can be made by any company or any two or three companies. It should be introduced, if at all, by a large number of roads having intimate relations. If the companies represented in the Joint Executive Committee were to unite in adopting it, probably that would suffice, and in that Committee, if anywhere, will be found the needed central authority. Such matters, it is true, it has not been accustomed to treat; but it is evident that it or some other organization will have to consider many questions of administration in which co-operation is necessary, and as it is ready-made at hand, the duty is likely

to fall upon it. Meanwhile, it is to be hoped that Mr. Shinn's paper will attract such attention and consideration that managers will be led to discuss the matter among themselves, and endeavor to discover some means by which the prevalent wastefulness in the use of cars may be lessened.

THE WESTERN VANDERBILT ROADS.

Last week were made the usual half-yearly statements of gross and net earnings, prior charges and divisible surplus of the Lake Shore & Michigan Southern, the Michigan Central and the Canada Southern railroads, which are among the most significant documents we get at this season, giving a clew to the condition of traffic between Chicago and the Western termini of the trunk lines; and especially interesting because neither these roads nor any other leading western connection of a trunk line, except the Chicago & Grand Trunk, makes monthly reports.

The half-year's business we should expect to compare most favorably with that of last year, chiefly because the half-year was very unfavorable last year, but also because the traffic in the first quarter of this year was exceptionally heavy, while that of the second quarter has been fairly good. The movement of freight eastward has been much larger than last year; and while the through shipments westward have been very much lighter, the rates have been more than twice as high, and the earnings from this freight decidedly larger. Passenger traffic was good both years, and rates on it well maintained most of the time last year and all of it this year—probably the earnings from it were larger this year where there has been no diversion of travel to new routes. Local freight, however, we suspect not to have been in an altogether satisfactory condition this year, though there are no definite statistics concerning it. The local agricultural freight, however, should have been much heavier on these roads than last year, because the country on their lines produced much more; and the falling off, if any, we should expect to find in the carriage of ore, coal, manufactures, etc.

The gross and net earnings and working expenses of the Lake Shore road for the half-year compare as follows with last year:

	1883.	1882.	Increase.	P. c.
Gross earnings.....	\$9,210,616	\$7,952,721	\$1,257,895	15.8
Expenses.....	5,698,779	5,359,676	339,103	5.8
Net earnings.....	\$3,511,837	\$2,593,045	\$918,792	36.6
Fixed charges.....	1,800,000	1,516,950	283,050	18.7
Balance.....	1,711,837	1,076,095	635,742	62.3
Per share.....	\$3.52	\$2.17	\$1.35	62.3

These gains, especially that in net earnings and the divisible surplus, seem very satisfactory. They would be altogether so but for the increase in fixed charges, due to the interest on the bonds issued to pay for the Nickel Plate stock, which of course makes no returns, and is not likely to make any for a long time to come. But for this, the amount available for dividends would have been \$4.09 instead of \$3.52 per share; and generally, we may say, that the construction of the Nickel Plate has imposed a yearly tax of \$1.14 per share on the Lake Shore stockholders, which will continue until dividends are earned on Nickel Plate stock. This is doubtless a great deal less than might have been lost if the new road had been worked by a hostile organization, but it nevertheless makes the Lake Shore so much less valuable than if the new road had not been built.

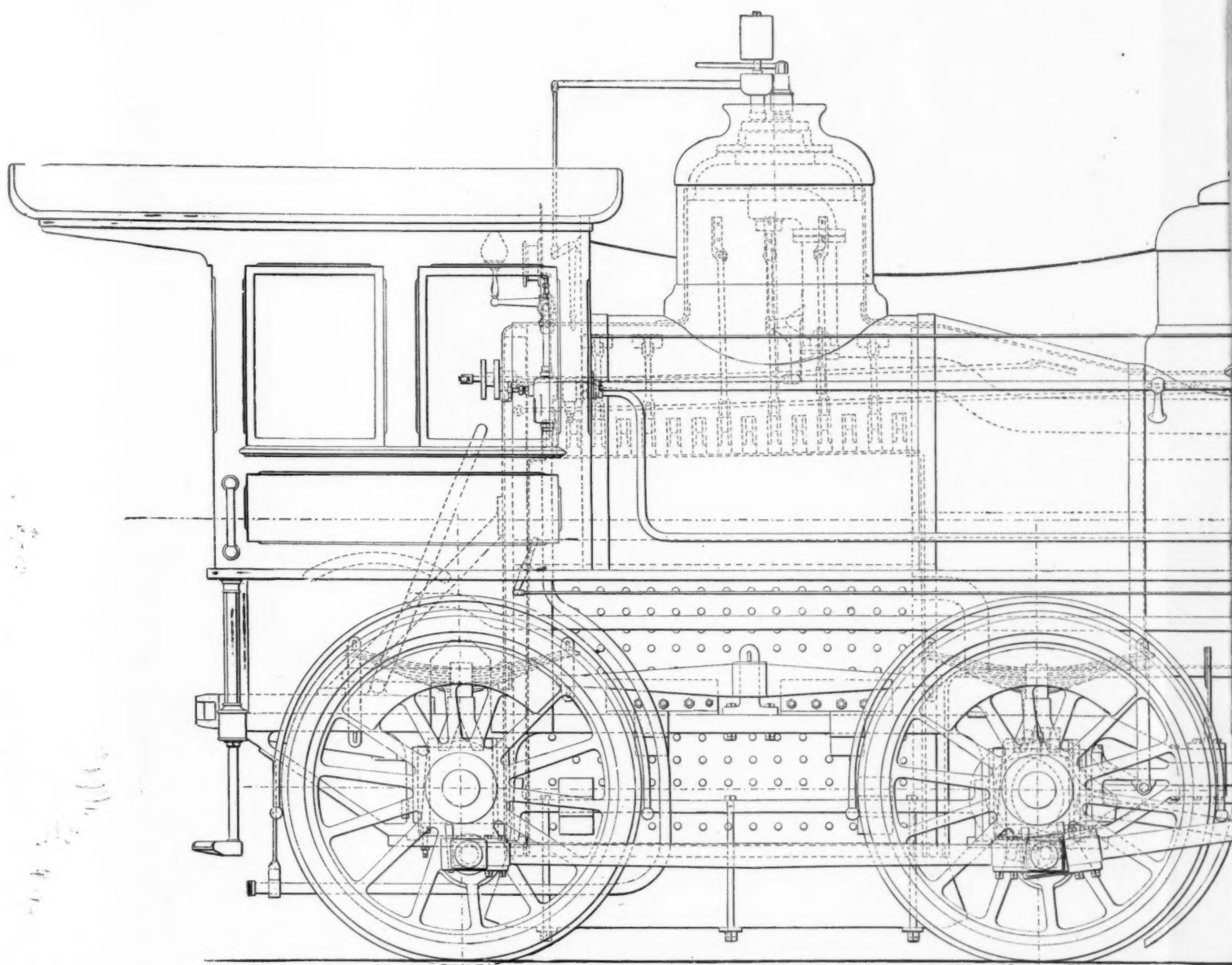
Nevertheless the company makes a good return for the half-year, and the increase in the profit per share of 62 per cent. over last year is very great. Let us make the comparison with previous years.

The earnings, expenses and surplus over the fixed charges in the first half of the year for the last seven years have been as follows:

Lake Shore & Michigan Southern—Earnings and Expenses January to June, for Seven Years.

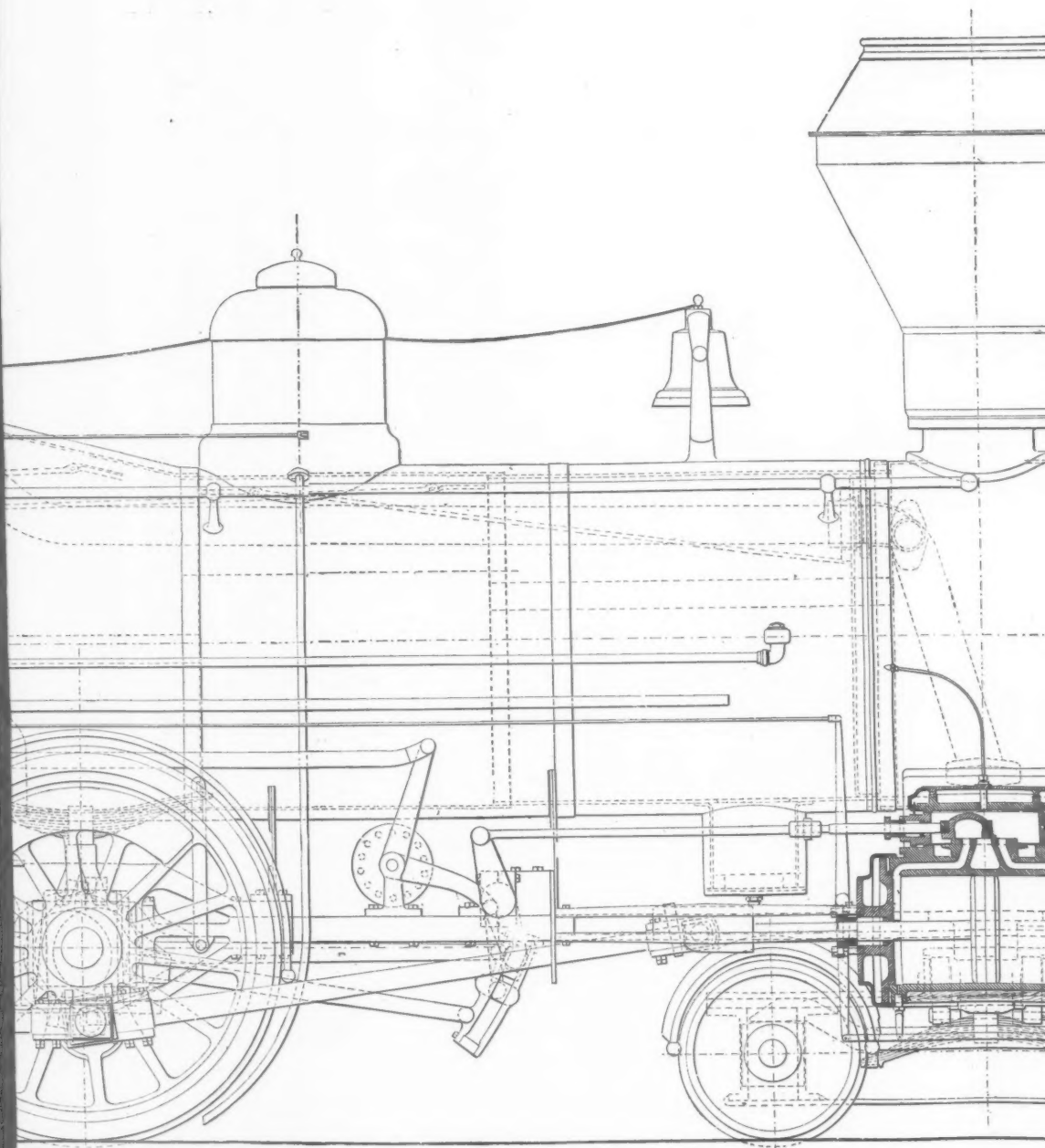
Year.	Gross earnings.	Expenses.	Net earnings.	Surplus over fixed charges.	Profit per share.
1877.....	\$6,461,106	\$4,628,119	\$1,832,987	\$445,247	\$0.90
1878.....	6,596,092	4,169,574	2,426,518	1,067,518	2.16
1879.....	6,038,482	4,217,921	1,820,561	1,370,561	2.77
1880.....	9,072,993	5,019,384	4,053,609	2,673,616	5.41
1881.....	8,954,926	6,285,164	2,669,762	2,307,762	4.66
1882.....	7,952,721	5,359,676	2,593,045	1,076,095	2.17
1883.....	9,210,616	5,698,779	3,511,837	1,741,837	3.52

We see here that the gross earnings of the half-year were larger this year than ever before, though only 14 per cent. more than in 1880; but the profit per share is 35 per cent. less than in 1880 and 20 per cent. less than in 1881. The increase of working expenses since 1880 has been equal to \$1.31 per share, and the increase in fixed charges to 85 cents per share. In 1880 everything was favorable; traffic was great, rates good, and prices had not yet risen enough to have a great effect on expenses. The increase in expenses has been steady, though not rapid, since; and for that reason the net earnings this year, though 36.6 per cent. more than last, are \$128,000 less than in 1881, when the gross earnings were \$256,000 less, and \$512,000 less



PASSENGER LOCOMOTIVE A

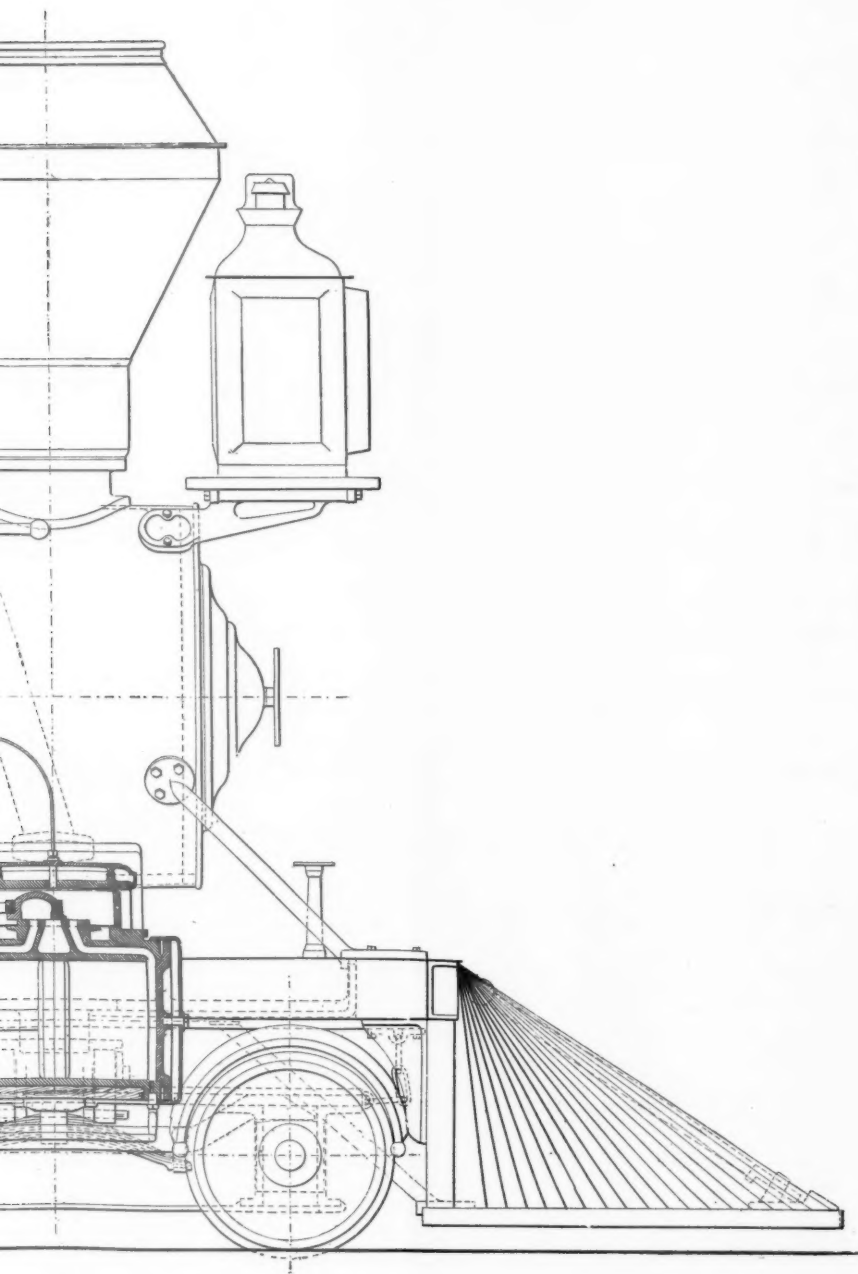
Built by the BALDWIN LOCOMOTIVE WORKS



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PASSENGER LOCOMOTIVE AT THE CHICAGO EXPOSITION.

Built by the BALDWIN LOCOMOTIVE WORKS, Philadelphia.





than in 1880, when the gross earnings were \$137,600 less.

It probably is not generally understood how large the Lake Shore's interest is in the mining and manufacturing industries of Northeastern Ohio and Western Pennsylvania. Besides its main line it has about 200 miles of branches in this district, and through its ly, the Pittsburgh & Lake Erie, feels the condition of business in the Pittsburgh district very decidedly. This, too, seem to have been becoming a larger and larger proportion of its total traffic. The shipments of coal, stone and lime, petroleum and iron over the road increased from 1,626,000 tons in 1878 and 2,050,000 in 1879 to 3,183,000 in 1882, from 26½ per cent. of the total tonnage and 27½ per cent. in 1879 to 34½ per cent. in 1882, with an increase at about as great a rate in manufactures, though much less in amount. On this account, and because, as we showed lately, an unprofitable condition of these industries is likely to reduce the profits on these freights to very narrow limits and much more than in proportion to the reduction in their movement, we should expect the Lake Shore to reflect in its earnings and especially in its net earnings any great disturbance to the great manufacturing industries of Northeastern Ohio and Western Pennsylvania. That it can make as good a showing as it does is pretty good proof that there has not yet been any great shrinkage in their production, and that the freight which they afford still pays profitable rates.

The Lake Shore, though it earned but \$3.52 in the half-year, decided to divide \$4. It did so last year also when the profit was but \$2.17 per share—little more than half what was divided. The managers then counted confidently on a great increase in earnings in the second half of the year, and their expectations were met, the profit for the second half of the year being \$6.20 per share. There is, however, no such prospect of an improvement this year as last. There is not such activity in industry, and the crops are not so promising; and it cannot be considered certain that the profits will be large enough in the second half of the year to make up the \$3 per share which will be required to keep up the dividend.

The Michigan Central Company this year has been working the Canada Southern Railway, and this makes a comparison with previous years in the old form impossible. The earnings and expenses of the two roads are given together. For the first halves of this year and last the figures are:

	1883.	1882.	Inc. or Dec.	P. c.
Gross earnings.....	\$6,740,000	\$5,568,283	I. \$1,171,716	21.0
Expenses.....	4,591,000	4,473,048	I. 117,952	2.6
Net earnings.....	\$2,149,000	\$1,095,235	I. \$1,053,764	96.2
Fixed charges.....	1,210,000	1,240,145	D. 30,145	2.4
Balance, profit.....	\$939,000		I. \$1,083,910	...
deficit.....		\$144,960		...

Under the contract between the two companies, this year two-thirds of the balance of profit goes to the Michigan Central and one-third to the Canada Southern, making a profit of \$3.34 per share for the former and \$2.09 for the latter; last year this agreement was not in effect, but if it had been there would have been a loss of \$96,606 (51½ cents per share) for the Michigan Central and of \$48,303 (32 cents per share, for the Canada Southern, the actual result being a profit of \$27,500 (15 cents per share) on the Michigan Central, and a loss of \$172,409 (\$1.15 per share) on the Canada Southern. The net earnings on the latter were but \$167,735 in the first half of last year, while the fixed charges were \$340,145, leaving a deficit in that half of \$172,410, which was changed to a profit of \$506,000 by the net earnings in the last half of the year.

These united companies have nearly as large a mileage as the Lake Shore, but their gross earnings, we see were this year \$2,470,000 (27 per cent.) less, and the net earnings \$1,393,000 (38 per cent.) less. On the other hand their fixed charges were \$590,000 (33 per cent.) less. The Michigan Central gained 21 per cent. in gross earnings and 96 per cent. in net, against the Lake Shore's 15½ and 36½ per cent., and the increase in the profit per share was \$3.19 on the Michigan Central and \$1.35 on the Lake Shore. It should be noticed that the Michigan Central, which was \$2.02 behind the Lake Shore in profits per share last year is within 18 cents of it this year. The union with the Canada Southern makes the Michigan Central more nearly like the Lake Shore, and it is doubtful if the two roads will have as great differences in profits hereafter as heretofore.

In order that we may compare the results on the united Michigan Central-Canada Southern system this year with those of previous years before the union, we have compiled from previous statements and from the annual reports the following table, in which the earnings, expenses, etc., of the Canada Southern in the first half of the year are added to

those of the Michigan Central, as given in previous half-yearly statements:

Michigan Central and Canada Southern earnings and profits in the June half-year for six years.

Year.	Gross earnings.	Expenses.	Net earnings.	Surplus.
1878....	\$4,285,628	\$3,172,863	\$1,112,765	\$126,066
1879....	4,605,691	3,269,318	1,336,373	329,447
1880....	4,495,869	4,089,021	2,407,878	1,361,978
1881....	6,156,532	4,402,812	1,753,720	503,408
1882....	5,568,283	4,473,048	1,095,235	144,910
1883....	6,740,000	4,591,000	2,149,000	939,000

*For these years the expenses of the Canada Southern for the first half of the year are assumed to be the same proportion of earnings as for the whole year, which is doubtless not quite accurate.

† Deficit.

Thus the two roads together earned gross more in the last half-year than ever before; but the working expenses increased so much that the net earnings were \$259,000 less than in 1880; and there being an increase in the fixed charges since then, the surplus available for dividends is \$425,000 less this year than in the first half of 1880, though \$375,600 more than in any other June half-year.

The comparison with last year is extraordinarily favorable, because in this half of last year these roads did worse than in any other period of which we have record, not earning the interest on their bonds. The effect of restored through rates and a good harvest is seen unmistakably in the change from a deficit of \$145,000 in the first half of last year to a profit of \$939,000 in the first half of this year.

It will be noticed that the fixed charges are reported less this year than last. There was a decrease on the Michigan Central, owing to some bonds being retired; but a large amount has been expended for construction by the Canada Southern, which will be paid for by an issue of second-mortgage bonds. Apparently, no charges have been made in the first half of the year for interest on these expenditures; they will considerably increase the fixed charges in the second half of the year, doubtless.

It would be interesting to know what has been the effect of the union of the two roads in this first half-year of its existence. This we cannot ascertain exactly, and could not if we had the earnings and expenses of each company's line separately. We believe that substantially the whole of the through freight that formerly was interchanged with the Great Western has been given to the Canada Southern, but only for a month has it had the entire through passenger traffic, during which time it is said that there has been a very large gain in earnings. On the other hand the Michigan Central has lost the heavy immigrant travel which the Grand Trunk and Great Western used to bring it from Canada (not coming from New York). The fact that the Michigan Central has made relatively greater gains than the Lake Shore is an indication that it has profited by the union, but the difference in the increase in gross earnings is not sufficient to be conclusive, and the Lake Shore has so much more of the iron and coal traffic, which we should expect to be less than last year, that it may have made as great a gain in through traffic as the Michigan Central.

In the second half of the year the Canada Southern will have a much larger share of the Michigan Central through passengers than in the first half. Its earnings have usually, but not always, been largest in that half, and last year its net earnings were \$651,500 then, against \$167,735 in the first half. But here we contrast the results of the best half-year in the history of the road with the worst, and the first half of this year has been so favorable that no such improvement can be expected for the second half, while it would not be at all surprising if there were no improvement then. In 1880, when traffic and rates were good in both halves of the year, 50½ per cent. of the Canada Southern's gross earnings were in the first half of the year; and in 1881, when the first half was favorable and the second very unfavorable, 54 per cent. were in the first half. The result of the coming harvest will have much to do with this, and also the condition of manufacturing industries. This road, however, is less affected by the iron industry than the Lake Shore and many other roads; on the other hand, it is much more affected by the lumber industry, which is the chief support of one long line, and a large item of traffic on others. It has been extraordinarily active for a few years, and is perhaps quite as much so now as ever, but it is liable to great fluctuations—nearly as much so as the iron industry.

Record of New Railroad Construction.

This number of the Railroad Gazette contains information of the laying of track on new railroads as follows:

Baltimore & Ohio.—The Steel's Run Branch is completed from Glenwood, Pa., to Finleyville, 16 miles.

East & West, of Alabama.—Track laid from East Tennessee Crossing, Ala., west 15 miles. Gauge, 3 ft.

Georgia Pacific.—Track laid from Irondale, Ala., east 5 miles. Gauge, 5 ft.

Green Mountain.—Completed up Green Mountain in Mt. Desert, Me., 1 mile.

Kentucky Central.—Extended from the Kentucky River south to Richmond, Ky., 11 miles. Gauge, 5 ft.

Northern Pacific.—Extended eastward to Missoula, Mon., 18 miles.

This is a total of 66 miles of new railroad, making 1,966 miles thus far this year, against 4,168 miles reported at the corresponding time in 1882, 1,972 miles in 1881, 1,899 miles in 1880, 761 miles in 1879, 606 miles in 1878, 618 miles in 1877, 673 miles in 1876, 407 miles in 1875, 637 miles in 1874, and 1,408 miles in 1873.

THE CHICAGO, ST. LOUIS & PITTSBURGH RAILROAD COMPANY, which has succeeded by purchase at foreclosure sale to the property of the Columbus, Chicago & Indiana Central Railway Company, seems to have very different relations with the Pennsylvania Company than its predecessor. The latter leased its road for a percentage of its net earnings to the Pittsburgh, Cincinnati & St. Louis Company, which worked it from Feb. 1, 1869, until Jan. 11 last, in the latter part of the time under the direction of the receivers. But the re-organized company seems to be entirely independent of the Pennsylvania Company. It works its own road with its own staff, and apparently is free to act in opposition to Pennsylvania Railroad interests if it chooses. Before the re-organization, the Pennsylvania Railroad Company owned \$4,762,000 of its mortgage bonds, but these did not entitle it to any of the \$30,000,000 of stock issued by the new company. It may possibly have a large or even a controlling interest in this stock, and it evidently has a powerful voice in the direction of the new corporation, as a number of Pennsylvania Company officers are also officers of the Chicago, St. Louis & Pittsburgh Company. But it acts entirely independently, Mr. Wm. L. Scott, the President, is not identified with Pennsylvania Railroad interests, and Pennsylvania traffic officers no longer represent it or direct its policy. The management works it apparently with the aim to make as much as possible for its own stockholders without regard to the effect on Pennsylvania Railroad interests. When the Pennsylvania worked it, it cultivated St. Louis and Louisville traffic over it (over the line between Columbus and Indianapolis) but not Chicago through passenger traffic freight. It had no trains to and from Chicago making good connections with the East, and carried no Chicago live stock. This work could be done for the better advantage of the Pennsylvania by the Fort Wayne road, but the Chicago, St. Louis & Pittsburgh apparently is bound to make every dollar it can for itself without regard to the Fort Wayne or its lessee. Of course as it receives pretty much all of its west-bound traffic from the Pennsylvania, and most of its east-bound (at Indianapolis), self-interest requires it to preserve intimate relations with it. Only the 187 miles between Columbus and Indianapolis out of the total 580 miles of the Chicago, St. Louis & Pittsburgh can be said to be necessary to the Pennsylvania. It does not require the much longer line to Chicago. But a line between Columbus and Indianapolis it must have in order to reach Indianapolis and St. Louis.

If this road had been independent at an earlier day it very likely would have become the Baltimore & Ohio's Chicago line, and prevented the construction of its Chicago Division. At a comparatively recent day the Erie might have been glad to make a permanent alliance with it. It does not make so good a line with it as Chicago & Atlantic does, but still it has for many years been one of the chief Chicago connections of the Erie and the New York, Pennsylvania & Ohio, and has brought more freight from Chicago to them, we believe, than to the Pennsylvania. It is so situated as to afford a favorable Chicago connection with the Chesapeake & Ohio, if the connection between Columbus and the Ohio River can be managed. The development of a Chicago through passenger and live stock traffic over the road should, it would seem, add considerably to its somewhat meagre net earnings, though not so much as if it had occurred before the last two new roads from Chicago to the East had been opened.

THE CHICAGO LIVE STOCK APPORTIONMENT as originally modified by Mr. Adams, the Arbitrator, to make room for the Nickel Plate line, has been confirmed by him after receiving arguments on an appeal. The appeal was made by the Nickel Plate, which wanted more than the 10 per cent. awarded it, and arguments were made by several other companies to show that not so large a part of the Nickel Plate's share should come from their percentage. The percentages by the old and new apportionments are:

	New.	Old.
Chicago & Grand Trunk.....	6	6
Michigan Central.....	23½	26
Lake Shore.....	32	36
Pittsburgh, Ft. Wayne & Chicago.....	23½	26
Baltimore & Ohio.....	3½	6
New York, Chicago & St. Louis.....	10	...

Thus the Lake Shore contributes 4 to the Nickel Plate's 10 per cent., the Michigan Central and the Fort Wayne 2½ each, the Baltimore & Ohio ½, and the Chicago & Grand Trunk nothing. This latter is because the dressed beef shipments are now included with live stock, and the Chicago & Grand Trunk has so much of this that it had claimed a larger allowance of live stock.

The Chicago live stock shipments make a very large business, which is now profitable, and the diversion of a considerable percentage of it will not be relished by any line. A further division will have to be made, however; for not only is the new Chicago & Atlantic road in position to command a share of it, but the Chicago, St. Louis & Pittsburgh will no longer go without that traffic, but will put on live

stock trains and compete with the other roads for a share of it, which it seems able to command. The amount of this traffic which a railroad can secure depends largely on the number of Eastern consuming points at which it can deliver to advantage. The Baltimore & Ohio is at a disadvantage at every important market except Baltimore; the Chicago & Grand Trunk delivers little outside of New England. The Fort Wayne carries to Pittsburgh, Philadelphia, Baltimore and New York, but very little to New England. The Lake Shore can supply Buffalo, Albany and all interior New York, as well as New York City, Boston and New England; and it also delivers at Pittsburgh, and can deliver cattle at Philadelphia and Baltimore, though we do not know that it does. The same field is open to the Michigan Central except Pittsburgh. The Nickel Plate has open to it Buffalo and all the country further east which the Lake Shore and the Michigan Central supply. This is a traffic, however, in which age, reputation and an established trade count for more, perhaps, than in ordinary freight traffic. Something of the qualities of a passenger carrier are required. Unless a road is comfortable for the cattle to ride on it cannot get many, and a rough road they will avoid.

CHICAGO THROUGH SHIPMENTS EASTWARD for the week ending June 21 have been, for four successive years:

	1880.	1881.	1882.	1883.
Tons	68,360	54,266	28,753	27,449

Thus the shipments this year were 1,304 tons (4½ per cent.) less than last year even, and were nearly 50 per cent. less than in 1881 and 60 per cent. less than in 1880. The week in 1881 was the one next previous to the open breaking out of the railroad war. The shipments this year were decidedly small.

Of the shipments this year 17.7 per cent. went by the Chicago & Grand Trunk, 17.8 by the Michigan Central, 16.7 by the Lake Shore, 24.5 by the Fort Wayne, 16.7 by the Chicago, St. Louis & Pittsburgh, and 6.6 by the Baltimore & Ohio. Thus 34.5 per cent. went by the two Vanderbilt roads and 41.2 by the two Pennsylvania roads, against the 45½ and 35½ per cent. to which they are entitled, respectively.

For seven successive weeks the Chicago shipments have been, in tons:

	Week ending—					
May 7.	May 14.	May 21.	May 28.	June 4.	June 11.	June 18.
40,482	36,270	26,677	25,054	26,003	29,399	27,449

Thus, though the shipments last week were 1,950 tons less than the previous week, they were greater than in any other week since the middle of May. But receipts at Chicago were so large in June that larger shipments were to be expected.

The imperfect report of through and local eastward shipments of flour, grain and provisions from Chicago by the six pool lines and also the Nickel Plate and the Chicago & Atlantic gives a total of 27,215 tons for the week ending June 23, against 18,729 tons in the corresponding week of last year, and 25,102 in the previous week of this year. Of the total last week, 949 tons are credited to the Nickel Plate and 2,054 to the Chicago & Atlantic.

EDITORIAL CORRESPONDENCE.

The Chicago Exposition of Railway Appliances.

The Niles Tool Works of Hamilton, O., have on exhibition twelve different machines, including a double axle lathe, on which it is said 20 master car-builders' standard axles are turned in ten hours, and a 9 in. slotting machine of new pattern with a larger reach than usual in such machines; a 3-in. engine lathe 14 ft. long; a 7-ft. horizontal boring machine especially adapted for turning steel tires (this machine has been sold to Thompson, Stern & Co., a London firm, for use in Manchester, England); one screw machine for making set screws, cap screws, studs, etc. This machine is made unusually heavy and strong, and will make screws from a bar from 2 in. in diameter to all the smaller sizes. The operation is as follows: A bar of iron, either round, square or hexagonal, is passed through the spindle, extending out to the proper distance for the length of the screw desired. This distance is regulated by a stop in the turret. A reducing tool in the turret head is then brought into service, reducing the bar at one cut to the standard diameter of bolt required. The thread is then made by the opening die plate, and afterward sized to the exact standard by a solid die in the turret-head. This makes the screws exactly uniform, and imposes very little work on the sizing die. The screw is then pointed and faced on the end and cut off. The carriage is provided with two tool posts, carrying tools for these different operations. Adjustable stops regulate the length of the screw, the length of the head, the length of the thread, etc., with perfect uniformity.

They also exhibit an arch-bar drilling machine for drilling car truck-frames. This machine has eight spindles. It is driven by a cone with three steps for a belt 4 in. wide, and is very strongly geared. The spindles are all operated by one heavy shaft, and drill the six or eight holes at one operation. Each spindle has a socket adjustable vertically, allowing the drills to be used at different levels. The spindles have lateral adjustment for change of centres. The end spindles have an adjustment from 3½ in. to 7 in. between centres, and the outside spindles an adjustment of 3½ to 14 in. between centres.

One radial drilling machine of 6 ft. radius is shown by them

The drill is adjustable in any position within a sphere of 12 ft. in diameter, drilling holes at any desired angle. The table also swivels, and can be adjusted to any angle. The radiating arm travels up and down on a turn column, and in almost every instance the drill can be brought to the work. It is furnished with power-feed and quick return motion, is heavily back-geared, and made very heavy and strong in all its parts.

A hydraulic power wheel press for wheels 42 in. in diameter, tested to 150 tons pressure, is provided with double pump, having two plungers, one 2 in. in diameter and one ¼ in. in diameter. By this arrangement the arm is moved rapidly where there is little or no pressure required, and more slowly when the pressure is high.

A wheel boring machine which will chuck 48 in. in diameter, for boring car wheels, is a very stiff, powerful machine. This is one of the heaviest of its class in the market, weighing fully 9,000 pounds, the metal being distributed in the best possible manner to resist the strains to which the machine may be subjected. It is provided with power frame. The feed motion is also of excellent design, and very simple in construction. A planing machine shown will plane 44 in. square and 12 ft. long. This planer is operated by tangent gearing running in oil, and perfectly noiseless in action. The method of driving affords a steady, uniform motion. The table reverses without shock or jar. This planer is built heavy and embodies all modern improvements. Among the other machines exhibited are a 16-in. shaping machine, a 30-in. vertical drill, etc.

Morgan, Williams & Co., of Alliance, O., have on exhibition three steam hammers, one 150 pounds, with single stand, one 1,250 pounds, single stand, and one 1,500 pounds, double stand. Patent treadle connection to the valve enables the operator to control the hammer and do his work at the same time. These hammers belong to the class in which the hammer head works in guides instead of being controlled by the piston rod. The gear in these small hammers is such that the machinery itself educates the operators how to adjust so as to suit the work being done. They have adjusting right and left-hand screws, which indicate to the workman how to regulate the blows of the hammer. They are arranged with a patent cushion arrangement, which consists of a recess cast on the top of the cylinder head, which contains a volute spring. Underneath this volute spring is a pin or plunger which projects underneath the cylinder head, and against which the piston will strike in case it gets beyond the control of the operator of the hammer. The head is made weaker than any portion of the cylinder, so that in case of accident it will be broken and not the cylinder itself. These hammers are operated by a balance valve, which may be described as a square piston valve. It consists of a valve of rectangular section, which works underneath a cap which is held down by set screws so as to make a steam joint on top of the valve. There are steam ports on both top and bottom, so that the area for admission of steam is double what it would be with an ordinary valve. In case the valve should wear it is readily adjusted or tightened up by facing up the bottom of the cap under which it works.

The Gordon & Maxwell Co., of Hamilton, Ohio, exhibit water station pumps with vertical boiler for railroad purposes.

The Yale & Towne Manufacturing Co.'s exhibit consists chiefly of cranes and other hoisting appliances, this department of the company's business being the one most directly of interest to railroad managers. It includes a 10-ton Weston pillar crane suitable for use in railroad yards and similar places. There is also a 5-ton jib crane, a 3-ton hand power traveling crane suitable for foundry use; a small Smith's crane and a variety of crabs, winches, Weston differential pillow blocks and other light hoisting appliances. Under the latter head may be mentioned a very complete system of overhead transfer track, with curves, switches and turn tables. This is applicable to the handling of work in machine shops and to the transfer and storage of merchandise of all kinds in warehouses, stations, etc. All of the Weston cranes and hoists embody the element of absolute safety, both to person and load, the construction being such that the load is always self-sustained and cannot run down, nor can the handles of hand cranes recoil on the operator. These cranes embody a great many novel devices tending to simplify the machines and to render them more convenient, yet safe, in use. This company is the first in the United States to make a distinct specialty of crane building, and during the past five years has developed many valuable and important novelties in this field and has extended its operations so that it is now building cranes of all types and capacities and applicable to all purposes.

Another feature of the exhibit comprises various weighing mechanisms based upon the inventions of Mr. A. H. Emery, the designer and builder of the famous 400-ton testing machine in the government arsenal at Watertown, Mass. It was hoped that a 50-ton Emery testing machine would be exhibited, but its completion in time for the Exposition was not possible. There is shown, however, a 20-ton Emery hydraulic platform scale, which embodies most of the important inventions of Mr. Emery relating to weighing machines. In this, the platform is carried directly upon four fluid supports or chambers, connected by small copper tubes with the weigh-beam case. The construction is such that the vertical motion of the supports and of the platform is less than 1/30 of an inch, so that, practically, pressure, rather than motion, is transmitted through the hermetically sealed tubes to the weighing mechanism. Here, by means of a reducing chamber, also hermetically connected with the tubes, the fluid pressure is transmitted through a steel column to the weigh-beam. The connections by which

the several levers are attached consist of a system of plate fulcrums, instead of the ordinary knife-edge fulcrum. The latter device, which is the cornerstone of all previous systems of weighing, possesses, as is well known, many defects, particularly when used under high pressures. The Emery plate fulcrum is a perfect substitute for the knife edge, and, as used, practically annihilates friction, and being unaffected by pressure or atmospheric conditions, is permanent and imperishable; so that a scale built on this system when once properly adjusted will retain its accuracy and sensitiveness undiminished for years. The 20-ton scale exhibited is so sensitive that an ordinary half-ounce letter placed on the platform will deflect the indicating needle not only when the scale is empty, but also when it is fully loaded. Pertaining to this part of the exhibit is also an Emery pressure gauge, indicating up to 4,500 pounds to the square inch, the construction of which embodies the same system of plate fulcrums as is used in the scales. The Emery testing machines are also constructed upon a similar system and possess an accuracy and sensitiveness under the severe pressures which obtain in such machines far beyond anything heretofore attained. The company is now building three 50-ton testing machines, which are to be followed in the works by others of 100 tons capacity, and it is prepared to contract for machines of any capacity desired up to 1,000 tons.

The company exhibits samples of such portions of its lock product as are applicable to railroad uses, including padlocks, car-door locks, etc., but does not attempt to make a full presentation of this department of its business. This company, as our readers know, is the successor of the well-known Yale Lock Manufacturing Co., its works being located at Stamford, Conn., where it employs some 650 hands. The western office is at No. 64 Lake street Chicago.

The Eureka Iron Co., of Wyandotte, Mich., exhibits specimens of plate iron, pig iron, blooms, bar iron, fish plates, etc.

G. A. Shoudy, of Lockport, Ill., exhibits his track jack for lifting rails and repairing track. It consists of shaft and windlass supported on a wooden stand and with a chain wound round the windlass, which is attached to the rail by a pair of clamps. The windlass is operated by a lever and ratchet wheel.

The Pratt & Whitney Co., of Hartford, Conn., exhibits a full line of machinists' tools, comprising planers 16 to 40 in. and up to 12 ft. table, planing 12 ft., the latter size being double head and using two tools; lathes from 13 in. to 27 in. and up to 12 ft. base. The list of lathes includes a gap lathe, 52 in. swing, automatic feed chucking lathes with turret head, for manufacturing purposes, obviating the necessity of removing the work from the chuck until finished; a 28-in. chucking machine for flat drill work; milling machines, No. 1 power and No. 3 power; a No. 3 turret-head screw machine, fitted up, in operation, making half-inch steel set screws; cutting-off machine, No. 2 and No. 3, cut-off stock to any length up to 4 in. in diameter, automatic feed; upright drills, No. 2, upright with automatic feed, quick return, back gear and depth gauge, with a table 24 in. in diameter; a 14-inch shaping machine with automatic feed, with longitudinal feed, circular feed, and up-and-down feed, this machine including 12-in. centres and Newell planer vise; 12-in. crank shaping machine with the same motions and range of work within its limit as the preceding; 10-in. pillar shape with Newell vise and hand lathes 15 in. and 18 in., the latter back gear, 8 ft. bed; Nos. 3 and 4 turret head bolt cutters.

Also No. 2 single head National bolt cutter with new style of head; No. 3 double head National bolt cutter, and Nos. 4 and 5 National bolt cutter.

A five-spindle nut tapping machine.

A No. 2 screw shaping machine used in connection with a No. 3 turret head screw machine.

A cutter grinder for grinding cutters and reamers straight, taper or spiral.

A twist drill grinder.

New pattern grinder drills that will cut the exact diameter of the twist drill and give the proper amount of clearance.

A bolt machine, Burnham's patent, for use by blacksmiths.

Taps, dies, die stocks, United States standard thread, from 1-16 in. up to 3½ in., including hand taps, both taper, plug and bottoming machine taps, stay bolt taps of all lengths up to 54 in., stay bolt taper reamers, United States standard thread gauges, in two varieties, hardened and not ground and hardened and ground in the angle of the thread from 1/4 in. to 2 in. inclusive.

Limit gauges for inspecting round bar iron used for United States standard bolts to insure uniformity in the size, the latter gauges being drop-forged from tool steel. Specimens of the latter work are also exhibited in standard sized gauges. Drop-forged tool steel, a complete set of standard sized gauges from 1/8 in. to 2 in. by sixteenths, and 2½ to 3 by eighths.

Cylindrical gauges external and internal; thread tools for cutting United States standard thread, constructed so that the sharpening is done by merely grinding on the top; chasers for cutting bolts in a lathe in the least possible time; one set United States standard thread gauge reference blocks.

The Kelly Scroll Section Manufacturing Co., Chicago, exhibits what is called the Kelly patent mineral wool steam pipe covering.

The Cliff & Righter Co., Limited, of Oswego, N. Y., exhibits specimens of the "Acme" elliptic single-plate spring. Unlike most other springs this consists of but a single plate, of elliptical section in the middle, which tapers down to the

form of a flat bar next to the ends. They also exhibit specimens of coil springs and have one of Riehle Brothers' testing machines in which the action of the springs is shown.

The E. Horton & Son Co., of Windsor Locks, Conn., exhibits an assortment of lathe chucks of various sizes for various purposes.

George P. Clark, of Windsor Locks, Conn., exhibits specimens of rubber-tired baggage truck wheels of various kinds. These are made for all sorts of purposes, are noiseless, and prevent the wearing of carpets, floors, etc.

R. T. Whelpley, General Agent of the Hamilton Rubber Co., Chicago, exhibits an assortment of rubber goods, including hose, belting, gaskets, springs, fire-buckets, etc.

The Delaware Bridge Co. has sent a number of photographs of the bridges which it has erected at different places, including the Coney Island iron pier, and bridges in various stages of construction.

W. W. Wilcox, Chicago, exhibits several cases of baggage checks and policemen's and railroad employes' shields, also stamps of various kinds, ticket punches, etc.

The Verona Tool Works, Metcalf, Paul & Co., of Pittsburgh, have an assortment of "Verona" nut locks, edge-rolled car springs, track tools and drill rods. They give a list of railroad companies on which the "Verona" nut lock is used, with the number used on each line. The total amounts to 53,862,006.

Young & Sons, Philadelphia, exhibit an assortment of engineering instruments, including a No. 6 transit, 20-inch level, a No. 7 transit, a No. 10 mountain transit, 18-inch level, a Burt solar compass, Young's new level, with specimens of leveling rods, chains and other instruments.

E. Remington & Sons, Iliou, N. Y., exhibit a number of specimens of their type-writers.

A. H. Abbott & Co., Chicago, exhibit a case of drawing instruments.

E. J. Brooks & Co., New York, exhibit a large assortment of their freight car seals. We expect to give a detailed description of these in future and will therefore say nothing more at present.

Buff & Berger, Boston, exhibit a case of surveying instruments, chains, tape lines and various other appliances used in surveying.

A. H. Andrews & Co., western agents for George D. Emery, of Boston, Mass., exhibit a large assortment of foreign woods of various kinds, some of them very beautiful specimens, especially a section of a rosewood tree, about 3 1/2 ft. in diameter. Woods of every variety are shown, many of the names of which would be as new to our readers as they were to the writer.

The Electric Industrial Co., of Boston, has an exhibit, which consists chiefly of an electric signal clock for starting railway trains. The essential features of the machine are an upright cylinder, which is drilled with a hole for each minute in the 24 hours, one set of holes being for week days and one set for Sundays. The train dispatcher sets up the time-table of the road on the cylinder by putting pins into the holes. It is then connected with the standard regulator of the station and keeps time with it. Whenever the time-table calls for the departure of a train, the large gongs in the waiting rooms and train house are struck automatically, and a warning signal of two or three blows is struck two or three minutes before the train should leave, and a departure signal is given just at starting time. The machine strikes week day signals until 12 o'clock Saturday night, when it automatically changes to Sunday time, changing back again to week day time at 12 o'clock Sunday night.

A number of specimens of standard clocks for railroads, manufactured by J. Henry Gerry & Brother, of Elgin, Ill., are also exhibited.

The Marks Adjustable Chair Co., of New York, exhibits a number of samples of its reclining and revolving chairs for railroad cars. These chairs are arranged so that the seat and the back are adjustable. The seat has a backward inclination and the back of the chair can be arranged at any angle desired. The whole is operated by two latches, one attached to each arm of the chair, so that a person sitting in it may adjust it to any desired position. It exhibits two kinds of these chairs, one with an extension supporting the feet and legs of passengers and the other a revolving chair which is without this extension. They are all extremely comfortable and indicate the progress which has recently been made in this part of railroad equipment.

This company also exhibits some beautiful specimens of chenille berth curtains and window curtains.

The Wheeler & Wilson Manufacturing Co., of Bridgeport, Conn., exhibits one of the Boynton patent magic frame directories for exhibiting at railway stations the schedule of outgoing trains. The directory is designed to be placed upon the wall of the station, and is operated by a single movement of a key lever, the changes in the schedule being effected by means of perforated cards. It therefore requires no mental effort to operate it, and it cannot make a mistake, and will present such and only such information as may be decided to be given by the management. The arrangement is extremely ingenious, and is now in operation at the Broad street station in Philadelphia and the Grand Central Depot in New York.

Mr. Boynton also exhibits one of his station indicators, which consists of a wooden case about 24 by 15 in., containing the names of the stations on a folding curtain. This is operated by mechanism consisting of a sack somewhat like that used on the vacuum brake, and is operated by an ejector on the locomotive, by which the air is exhausted from the sack. The locomotive runner has a similar indicator in the cab, so that he can see the position in which it stands at every station. It is now in service on the Central

Division of the Philadelphia, Wilmington & Baltimore road, and has been in operation there for two years.

Giles Brothers & Co., Chicago, exhibit an assortment of railroad clocks, watches, etc. They are making a class of fine watches at reasonable rates for the use of railroad men. These watches are mounted in both gold and silver cases. They exhibit a very beautiful watch for railroad engineers and conductors which is inclosed in a case made in imitation of a car wheel, the tread of the wheel and flange forming the outside of the case. What would be the centre of the wheel is beautifully engraved with a locomotive on one side and a blank space on the other for the name of the owner. The movement of these watches is made by the Elgin Watch Co., and is specially designed for keeping time on railroad trains. They exhibit some watches of their own make with beautiful and very elaborately engraved cases. They also exhibit one of their watches in what they call a dust and water-proof case. These are intended to exclude dust and water. One of them was exhibited running immersed in water.

They also exhibit two different sizes of extra fine locomotive clocks, intended for use in cabs of locomotives. They have also a tower clock intended for railroad stations, giving time by four different dials, and a variety of station clocks; also a globe for indicating the time at any point on the earth's surface, which illustrates very forcibly the necessity of some reform in the system of keeping time on railroads.

Hagstoz & Thorpe, Philadelphia, proprietors of the Keystone watch case factory, exhibit a variety of watch cases manufactured by a new process out of flat plates of solid silver. The backs are made without any solder. They are made with a dust-proof band on the inside, which effectually excludes all dust or moisture from the movement of the watch. They exhibit a great variety of forms and designs of these cases, some of them most elaborately decorated and others of the plainest possible description. They also exhibit a gold case which is formed out of a plate composed of a plate of composition with a gold plate on each side of it.

The composition is entirely covered with the gold plate, thus reducing the cost of the case very materially and adding to its strength. They also exhibit a number of cases engraved with views from different railroads, including Mauch Chunk, the Niagara Suspension Bridge, Niagara Falls and a variety of other similar views. They also show cases engraved with locomotives, cars and other designs appropriate to railroad service.

Harvey Brothers exhibit a case of corporation uniforms of various styles and patterns.

A. French & Co., Pittsburgh, Pa., exhibit an assortment of elliptic and semi-elliptic, spiral, equalizing, keg-shaped and street-car springs. The character of the work made by this establishment is too well-known to require any comment.

R. B. Stone, of Chicago, exhibits a large assortment of foreign and domestic woods of various kinds. Probably few persons have any idea of the variety of American woods, and a careful examination of this exhibit would be a revelation to most car-builders, as well as most other persons interested in such matters.

D. A. Hopkins, of New York, exhibits his well-known lead-lined journal bearings for cars.

The Empire Car Roofing Co. is represented in the Exposition by a booth representing a freight car covered with one of its roofs.

The Pittsburgh Forge and Iron Co. of Pittsburgh, Pa., exhibit specimens of car axles of various kinds, some of which have been tested and bent into various forms to show their strength, ductility and toughness. A tabular statement of the tests to which they have been subjected is also appended to some broken specimens, which we have not space to publish. They also exhibit an assortment of bolts and nuts, track bolts, stay bolt iron in its finished condition—bridge bolts, and fish plates of various forms.

James P. Marsh & Co., of Chicago, exhibit an assortment of steam and hydraulic gauges of various forms.

George W. Hunt, of Philadelphia, exhibits a full size model of what he calls his patent device for lighting the steps of cars and carriages. It consists of a lamp placed under and behind the steps of a railroad car. It is arranged so as to throw its light outward towards the steps, thus illuminating them thoroughly. A red lens at the rear acts as a danger signal.

Arthur E. Rendle, of New York, exhibits a section of what he calls his Acme glazing for skylights, etc. It is shown full size and illustrates his system of glazing for roofs very clearly.

The Vulcanized Fibre Co., of Wilmington, Del., exhibit a great variety of objects made of its vulcanized fibre; the principal of which are dust guards for use on car journal-boxes and washers for track-bolts and journal-box covers. This material is also applied to a variety of other purposes, as handles for gauge-cocks, non-conductors for electrical purposes, etc.

W. C. Allison, of Philadelphia, exhibits an assortment of wrought-iron pipes, pipe couplings, etc., of which he is an extensive manufacturer.

The Bridgeport Wood Finishing Co. exhibits samples of its paints, and of Wheeler's wood filler and primer, driers and japan, of which it is manufacturer. It exhibits specimens of a variety of woods finished with Wheeler's wood filler and one coat of varnish. The finish is all that could be desired and indicates what may be done with this material.

The E. D. Albro Co., Cincinnati, exhibits a variety of veneers and fancy woods, most of them finished and var-

nished. A noticeable feature in the exhibit was its card printed on a thin piece of veneer.

Cory, Ogden & Parker, Chicago, exhibit specimens of what they call Parker's cement paint, in eight different shades. It is, of course, difficult to tell anything of the quality of these paints by looking at them. All that can be said is that their appearance is all that could be desired.

The Chester Steel Casting Co., of Chester, Pa., exhibits a variety of steel castings, such as locomotive cross-heads, guide-yokes, rail straighteners and a large bevel wheel, about 4 ft. in diameter.

Paulip T. Justice, of Philadelphia, exhibits samples of his patent weldless, solid-drawn steel tubes. These tubes are used in locomotive work for bushing sleeves and collars and similar purposes. They are made of any diameter and thickness and are cut to the required length. He also exhibits samples of hydraulic jacks, which are a specialty of this exhibitor; also a model of a dead-stroke hammer, which is a well-known implement among railroad men and manufacturers.

The Chicago Tire & Spring Works exhibit an assortment of car wheel and locomotive tires of various sizes from 36 in. to 6 ft. 3 in. in diameter. These tires are manufactured at Melrose near Chicago, and are rolled out of imported English blooms. It is claimed that these tires are rolled so as not to be 1/32 in. out of a true circle. They also exhibit a variety of elliptic and semi-elliptic springs for freight and passenger cars and locomotives, and an assortment quite too great to enumerate of spiral springs for all purposes about railroads.

Andrews & Clooney, New York, exhibit a variety of elliptic and semi-elliptic springs for cars and locomotives; also spiral springs for street and steam cars, and cast-iron wheels.

The Helmbacher Forge Rolling Mills Co., of St. Louis, exhibits a pair of frames for a switching engine in the rough, equalizing bars for passenger car trucks, Miller coupling-hooks and buffers and levers; standard car axles, some specimens made of puddled iron and others of wrought iron, and a sample of an axle half finished, showing the bars of wrought iron at one end before being welded together; also a locomotive driving axle, and Hudson's patent wrecking frog, which is intended for replacing cars which are derailed. The company also shows a variety of pins and links of various forms, sizes and patterns. This exhibit illustrates very strongly the necessity for the adoption of standards in these parts of railroad equipment. Specimens of links and pins are exhibited bent into various forms, showing the test to which they have been submitted; also other unfinished specimens showing the process of manufacture.

The Farist Steel Co., of Bridgeport, Conn., exhibits a variety of elliptic and spiral springs for passenger and freight car service. It shows an example of one spring which has been in use on the Chicago & Northwestern road for nine years, and shows no diminution in size or in strength.

The National Railroad Supply Co., of Des Moines, Ia., exhibits specimens of Loeke's joint lock. This consists of a combination of the old-fashioned double-lipped chair and angle-bar fish plates. The latter are driven in underneath the lips of the chair and are held in position by a sort of rigid frame in the flange of the angle fish plate. It is claimed that these can be securely fastened in this way without bolts or nuts. It has been used experimentally on the Chicago, Burlington & Quincy, the Chicago & Alton and the Chicago, Rock Island & Pacific railroads.

James Spear, of Philadelphia, exhibits a variety of his well-known car heaters with anti-clinker grates and the other improvements for which his stoves are noted. The general principle of this stove is that of heating by convection or by the introduction of cold air which is warmed in the stove and delivered into the car warm. By this means a continued supply of fresh air is supplied to the car.

Charles W. Pickering & Co., of Philadelphia, exhibit a variety of elliptic, semi-elliptic and spiral springs, intended for locomotives, freight and passenger cars.

William H. Foulke & Co., of Chicago, exhibit a variety of office desks, including several made on the Wooton pattern. Most railroad men are thoroughly familiar with the conveniences of the latter, so that no description is required. It may be added that the conveniences of these desks are very fascinating to editors as well as to railroad men, and that everything seems to be provided to avoid getting books, papers, etc., into that confusion which railroad officers and editors constantly struggle to avoid. The desks exhibited are in both walnut and mahogany and are suited for almost any description of office use.

McConway, Torley & Co., of Pittsburgh, Pa., exhibit both the Janney freight and passenger car coupler in full size and arranged on a truck running on rails so that its operation can be shown both in coupling and in uncoupling. The trucks with the freight car coupler attached are arranged on rails, one set of which are six inches higher than the other, to show that it will couple easily with this difference in height. The freight car coupler is exactly like the well-known passenger car coupler, with the exception that no side spring buffers are provided on the freight cars. Instead of being arranged to uncouple with a lever from the platform, the freight car coupler has a bell crank immediately over the coupling hook, which is separated by a rod which extends to the out side of the car, so that a man on the ground, without going between the cars, can uncouple. This has been put on 50 cars on the Pennsylvania Railroad, and the Chicago & Alton is now applying it to 100 cars. It has also been applied experimentally on a number of other roads, so that it is in a fair way of being thoroughly tested at a very early day.

Contributions.

Train Rules.

VIII.

The rule that may be found in the place of honor in the largest number of codes, and which may therefore be regarded as the most important of all as decided by experience, is, without doubt, that which defines the rights of trains running in a certain direction over those of the same grade moving in the opposite direction. And although this subject is universally (and justly) regarded as worthy of such a prominent place, it is, strange to say, in a great many cases the first place where ambiguity and looseness of construction will be noticed. After all, the only really infallible and "truly true" rule is that irritator of the bump of cautiousness which enjoins a constant adherence to the "safe side;" and having told the employes how to settle their doubts, there seems to be a general purpose to make it certain that they shall have a plenty of them (even if they are small ones) on which to exercise the rule.

If any one rule more than another ought to be clear and simple this is the one, and it will pay to take a little pains to make it so. Most of the difficulties vanish, however, when we confine our attention to a single train, and cease trying to convey, in a single sentence, different ideas to different men. Aside from this, the chief faults arise from the simple nature of the business on new roads where the rules are originated. It is generally assumed that at all way stations the arriving time and leaving time are exactly the same, and at meeting places that both trains arrive and depart at the same moment, and the rules are worded accordingly; thus making no provision for meetings where both trains stop from 15 to 60 or more minutes and neither arrive nor depart together. In many cases trains are told to wait for the right to the road under circumstances where they are quite likely to acquire it without waiting. When a road grows so as to have a portion of its line double-tracked, this rule, instead of being reconstructed, is simply patched (and so with others), so that, except to the old men who grow with the road, there is more or less confusion of ideas. As before observed, most of these defects are nominally provided for in the general summing up, by the "caution rule;" but where the purpose is to leave room for as few doubts as possible, they ought to be weeded out. It is impracticable to arrange the captions, etc., here as they ought to be in the manual, but it may be explained in passing that the titles, such as precede rules 81, 88 and 95, should be in the form of a running headline, a certain page or number of pages being given to each important division of the subject.

RULES FOR THE USE OF SINGLE TRACKS.

81. WHERE THERE IS ONLY ONE MAIN TRACK in use you are to be guided by the following rules (82 to 87 inclusive).
82. If your train is of the first class, it must, while on single track, be treated as second class; on single track all regular passenger trains are second class.
83. On the branches "toward....." shall be taken to mean toward the main line.
84. When running toward..... you have the right to the road over all trains of the same class as yours which are moving in a direction from.....; but if a train of the same class as yours is not met at the place where you ought to meet it, you must leave that place at least five minutes late, and must keep at least five minutes late until you meet it.
85. When running in a direction from..... you must keep out of the way of all trains of the same class as yours which are running toward....., being careful not to move your train forward unless there is time to reach the next station (place where you can meet) before the time set down in the time-table for any opposing train of the same class to leave there.
86. When a train ahead of you carries a red signal and you are running under the protection of it, you must meet all opposing trains of the same class as yours at the same place that the bearer of the signal meets them.
87. Wherever you meet a train which bears a red signal in front, and which is of the same class as yours, at that same place you must meet all trains running under the protection of that signal.

Rule 82, as will be seen, is arranged for a road that is part single and part double track; for one composed wholly of single track it could be differently worded, though that would not be necessary.

The elaborate classification of trains so as to give different degrees of importance to express, accommodation and special passenger, live-stock, ordinary and local freight, pay car, gravel and the various other trains, although desirable and on double track quite practicable, would on single track cause confusion to more than balance its usefulness; at all events, the occasions on which it would be useful on a single track road are so comparatively infrequent that the matter could very well be left with the train despatcher, and the general rules thus be left unencumbered by it.

Stating the direction as from or toward a certain place seems fully as clear as any form and is used by first-class roads, though perhaps nothing more serious than personal fancy decides between it and the more common form of north and south; east and west. The construction of Rules 86 and 87 presupposes that regular trains and their extras ("sections" following under a red flag) shall keep near together. There are of course, instances where the despatcher would have to give special orders in order to prevent crowding and delay at the meeting point, but the simplicity of the plan shown here, as compared with that which leaves a dull-headed conductor in doubt as to whether he has a right to follow a red flag to a certain place or to a certain time is undoubtedly in its favor.

FREIGHT CONDUCTORS.

88. WHEN RUNNING A FREIGHT TRAIN you are to be guided by Rules 89 to 94 inclusive.

89. You must keep the rate of speed as near . . . miles an hour as possible, except when safety requires a lower rate; you are particularly required to govern it when running down grade.

90. When running a train that has no live stock in it you must be careful not to hinder any train that does have such freight.

91. When running a train that has no live stock or perishable goods in it you must be careful not to hinder any train that does have either of those kinds of freight.

92. You must keep the doors of the cars closed and fastened.

93. You must do whatever switching any station agent may require of you, but must report to your superior officer any case where an agent requires unreasonable service.

94. In the transportation of freight you are to act under the orders of the General Freight Agent.

Some roads require the freight conductor to control the speed of the train only when on descending grades; but, as a reminder that he is not entirely without responsibility in the matter, the first clause of Rule 89 seems reasonable.

Rules 90 and 91 refer to a subject which cannot, perhaps, be fully covered by a general rule, but which, nevertheless, ought never to be lost sight of. It is not always expedient to treat stock trains, etc., as higher class trains, and yet, within certain bounds, which must often be left to the conductor's judgment, they ought to take precedence over ordinary merchandise. A sort of reminder, as above outlined, seems therefore to be at least better than nothing, and will perhaps answer for such cases as are not looked after individually by the division superintendent or despatcher.

In those very rare (?) cases where trainmen are slightly tinged with selfishness, and have a provident desire to balance their caboose with a good stock of spare couplings, the rule requiring that "two pins and one link be left with each car," is generally considered very necessary; but if anything is to go without saying this simple matter of discipline certainly ought to; at all events, the fact that the Chicago Exposition has made it absolutely certain that all ordinary link-and-pin couplings must shortly be consigned to the scrap heap, will warrant us in passing over the subject for the present.

THE SCRAP HEAP.

Car Notes.

The Wason Manufacturing Co. at Brightwood (Springfield), Mass., last week delivered several passenger cars to the Lehigh Valley road.

The Grand Trunk shops at Point St. Charles, Montreal, are at work on an order for 55 new passenger cars for the road. They are to be superior to any cars now in use on that road.

A dispatch says that the New York, Lake Erie & Western Co. has made a contract with the Gifford Car Coupler & Manufacturing Co., of Ohio, for the use of the Gifford coupler on its freight cars.

Bridge Notes.

The contract for building the new iron bridge over Kettle Creek, at St. Thomas, Ont., on the Canada Southern road, has been let to the Detroit Bridge & Iron Co., the work to be finished by Dec. 1. The bridge will be 1,866 ft. long and 92 ft. high at the highest point; it will replace the wooden bridge which has been in use since the road was built.

M. S. Cartter & Co., in St. Louis, are building two Howe-truss draw spans, each 150 ft. long, for Black and McGirt creeks, on the Jacksonville, Tampa & Key West road, in Florida.

Iron Notes.

The Indianapolis Rolling Mill made its first steel rail on June 21, the new steel rail mill being now ready for work. Twenty-five of the 35 blast furnaces in the Mahoning and Shenango Valleys are in operation, producing 2,000 tons of metal per day.—*Youngstown (O.) News Register*.

A second stack is to be built at Powellton Furnace, Bedford County, Pa. The new furnace will be of very large size.

Swede Furnace in Montgomery County, Pa., is preparing to go into blast.

Citico Furnace, in Chattanooga, Tenn., is about half finished. It will be 69 ft. high and 22 ft. bosh.

Graff, Bennett & Co. last week called a meeting of their creditors, which was held in Pittsburgh, June 20, about 85 per cent. in amount being represented. It was decided to grant the firm an extension of three years. A statement made by one of the members showed the liabilities of Graff, Bennett & Co. to be \$1,282,752, and the liabilities of the Grafton Iron Co., for which they are responsible, \$330,000. Their personal assets are \$1,169,637, besides which they have real estate worth \$2,000,000. The firm agrees to pay 40 per cent. of the indebtedness during the next 16 months. The payment of the balance will be secured by bonding their estate. Work will be continued in the mill as usual.

The blast furnace of the Iron & Steel Co., at Ironton, O., has been banked up and will probably go out of blast.

Pine Grove Furnace, near Ironton, O., went into blast last week.

The furnace of the Ohio Iron & Steel Co., at Lowellville, O., has gone into blast again.

Manufacturing Notes.

The Elkins Manufacturing & Gas Co. has sold the right, title, good will and all interest in the Ajax metal to J. G. Hendrickson, Francis J. Clamer and Frank Bushnell, who will hereafter manufacture that metal, trading under the name of the Ajax Metal Co., with office at Nos. 617 and 619 Arch street, Philadelphia.

The National Machinery Co. at Tiffin, O., has recently built three of its patent spike machines for the Central Pacific shops.

The Iowa Iron Works Co., of Dubuque, has just built a boat with iron hull, 75 ft. long, 15 ft. beam, to draw about 20 in., run 12 miles an hour, and accommodate 150 people. It will be run in connection with the new hotel at Spirit Lake, being built by the Burlington, Cedar Rapids & Northern Railroad.

The Deane Steam Pump Co., of Holyoke, Mass., has removed its office and warehouses in Philadelphia from No. 43 South Fourth street to No. 49 North Seventh street.

Henry R. Worthington, manufacturer of steam pumps, water metres and hydraulic machinery, has opened a new branch office and warehouse at No. 95 Lake street, Chicago.

The Rail Market.

Steel Rails.—The market is unchanged, with a number of small sales reported at \$38 to \$39 per ton at mill. Few or no orders for winter have been placed, but the mills are full of orders for summer delivery.

Rail Fastenings.—Spikes are unchanged at \$2.60 per 100 lbs. in Pittsburgh. Track bolts are lower, quotations being \$3 to \$3.10 per 100 lbs. for square and \$3.20 to \$3.30 for hexagon heads. Splice bars are quoted at 2 cents per pound.

Old Rails.—Sales are reported of small lots at \$22 per ton in Philadelphia for tees and \$26 for double-heads, but the market is very quiet.

Asking for a Pass.

The most importunate applicant for passes is generally well fixed, in a financial sense, and not infrequently rolling in wealth. He is literally a pass fiend. He wants a pass to the theatre, upon the road, upon the street cars, upon the ferries; in fact, his purse strings become spasmodically tightened when there is the slightest possibility of getting a pass. Of course, he does not accept the pass as a money-saver. Oh, no—he takes it only as a compliment to his standing in the community. His self-importance becomes immensely magnified, and if perchance the compliment of a free pass is not forthcoming, the fire of indignation is aroused, and the pocket nerve above everything else begins to sorely bleed.

Some time ago a prominent Western capitalist, a man of great wealth, whose leisure moments are altogether occupied in clipping coupons from railroad, state and federal bonds, called on the newly-appointed general manager of a trunk line and blandly asked for a pass to—and return.

"Upon what ground, Mr. —, do you ask this pass?" queried the general manager.

"Why, sir, I have never before been asked such a question; I am a man of influence, sir, and was a director in this road for many years, sir."

"Well, don't you think a man of your influence and wealth can afford to pay his fare? We are not running this road for fun or individual accommodation. We are here to make money, and all who want to travel over our road must pay fare."

There was little consolation in this to the pass fiend who felt grievously slandered, and departed with loud talk of displeasure.

Ever since he has always been in the humor to denounce what he called the "meanness of this impertinent manager to refuse a pass to a Gentleman." And yet his income is estimated at \$4,000 a month.

The general manager acted with commendable tact. There is entirely too much license in the issuance of passes. Put on the brakes.—*Express Gazette*.

Protection Against Drifting Sand.

It is rather remarkable that not a single train on the Oregon Railway & Navigation Co.'s Columbia River road has been detained by sand this year. This happy state of affairs has been brought about by raising the track in many places where it was too low, and by the natural growth of vegetation. In former years cattle on the ranges of Umatilla County ate clean everything in the way of weeds and grasses, leaving the sand loose and light. Since the construction of the railroad, the weed known as "dock" has grown in great abundance at several places, and it is believed that in a few years the problem of keeping the track entirely free of sand will be solved. This problem still baffles the Southern Pacific Railroad people, because they can get nothing to grow in their deserts.—*Portland Oregonian*.

The Passaic Rolling Mill Literary Association.

Some time ago a number of the workmen employed in the mills of the Passaic Rolling Mill Co. in Paterson, N. J., organized an association for mutual improvement. They labored under many difficulties, but persevered, and recently the officers of the company took an interest in the affairs of the Association, which has resulted in the erection of a building at the expense of the company for the use of the men. The building adjoins the rolling mill and is two stories high; the lower story is used by the company for the storage of bar iron, the upper story being arranged for the purposes of the Association. It contains a large room for meetings, a reading room and a room for conversation, games and similar purposes. All the rooms are comfortably and attractively fitted up, and the large room is provided with an excellent organ. The reading room is to contain a library, towards which only a small beginning has been made as yet, with the hope that its growth will be rapid.

The rooms being finished and ready for use, were formally opened on Saturday evening, June 24, when speeches were made by President Watts Cooke and Secretary Fayerweather of the Rolling Mill Co.; Mayor Barnert, of Paterson, and several members of the Association. Letters from Congressman Wm. Walter Phelps and others were read and there was some very excellent singing by members of the Association and their wives and daughters.

The example thus set is one which might be followed with great advantage elsewhere, and, after reading the full report of the proceedings in the *Paterson Press*, it is easy to believe and to understand the statement that there has never been a difference between the Passaic Rolling Mill Co. and its workmen which has not been satisfactorily adjusted and ended by friendly discussion.

A Missouri Pacific Hospital.

The immense mileage and the vast array of employees comprised by the Gould lines in Texas have convinced the management that a branch hospital within the confines of that state is advisable, as the Carondelet and Sedalia hospitals are so remote as to render it impracticable to bring injured men to them from the Lone Star state. Accordingly action has been taken as set forth in the following circular which was issued June 11 by the General Transportation Manager:

"It has been decided to establish a hospital at Fort Worth, Tex., for the benefit of the officers and employees on lines of this system in Texas and Louisiana.

"The duties of Dr. F. W. Jackson, as surgeon, are hereby extended to include these lines. He will have charge of the hospital and the appointment of its officers. All arrangements made with local surgeons on lines named will be made under his direction and supervision."

The hospitals will be operated on the same general plan as the main institutions.—*St. Louis Republican*.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings will be held as follows:
Central, of New Jersey, special meeting, at the office in Jersey City, N. J., July 6.

Dividends.

Dividends have been declared as follows:
Canada Southern, 2 per cent., semi-annual, payable Aug.

1. Transfer books close June 29. The last dividend was 2½ per cent., paid Feb. 1, 1881.

Chicago, Rock Island & Pacific, 1½ per cent., quarterly, payable Aug. 1. Transfer books close June 30.

Lake Shore & Michigan Southern, 2 per cent., quarterly, payable Aug. 1. Transfer books close June 29.

Michigan Central, 3 per cent., semi-annual, payable Aug. 1. Transfer books close June 29. The last dividend, in February, was 2 per cent.

Pittsburgh, Fort Wayne & Chicago (leased to Pennsylvania Company), 1½ per cent., quarterly, payable July 2 on special stock and July 3 on ordinary stock.

St. Paul, Minneapolis & Manitoba, 2 per cent., quarterly, payable Aug. 1. Transfer books close July 16.

Wilmington, Columbia & Augusta, 3 per cent., semi-annual, payable July 10.

Woodruff Sleeping & Parlor Coach Co., 1½ per cent., quarterly, payable July 2.

Wilmington & Weldon, 3 per cent., semi-annual, payable July 16.

Worcester & Nashua, 1½ per cent., semi-annual, payable July 2, to stockholders of record June 25.

Railroad and Technical Conventions.

The General Baggage Agents' Association will hold its next semi-annual meeting at the Tremont House, Chicago, Aug. 8.

The Road-Masters' Association of America will hold its first regular meeting in St. Paul, Minn., Sept. 12.

The Master Car-Painters' Association will hold its annual convention in Baltimore, Sept. 19.

The New England Road-Masters' Association will hold its first annual meeting in Boston, Sept. 20.

The American Street Railway Association will hold its next meeting in Chicago, Oct. 9.

The General Time Convention will hold its fall meeting at the Grand Pacific Hotel in Chicago, Oct. 11.

The Southern Time Convention will hold its fall meeting at No. 46 Bond street, New York, Oct. 17.

The American Association of Railroad Superintendents will hold its fall meeting in Washington, Oct. 23.

ELECTIONS AND APPOINTMENTS.

Asheville & Spartanburg.—At a meeting held in Spartanburg, S. C., June 13, the board elected R. Y. McAden, President; W. H. Inman, First Vice-President; A. L. Rives, Second Vice-President; James Anderson, Secretary and Superintendent; A. S. White, Treasurer and Auditor.

Batavia, Albion & Lake Ontario.—The officers of this new company are: President, Frank H. Goodyear, Buffalo, N. Y.; Vice-President, E. Kirk Hart, Albion, N. Y.; Secretary and Treasurer, Charles A. Sweet, Buffalo, N. Y.; Chief Engineer, N. G. Beardslee, Warsaw, N. Y.

Burlington & Northwestern.—At the annual meeting in Burlington, Ia., June 21, the following officers were chosen: President, T. W. Barhydt; Vice-President, David Leonard; Secretary and Treasurer, R. M. Green.

Canada Southern.—The board has elected Cornelius Vandertilt, President; C. F. Cox, Vice-President; Nicol Kingsmill, Secretary; Allyn Cox, Treasurer. The road is worked by the Michigan Central.

Central Pacific.—Mr. J. H. Whited is appointed Superintendent of the Truckee Division, vice Mr. Frank Free, resigned. Appointment took effect June 5.

Chicago, Burlington & Quincy.—It is understood that a number of changes are to be made on this road, some of which are announced as follows: Mr. Henry B. Stone, now General Superintendent, will be Assistant General Manager, with charge of all lines east of the Missouri River; Mr. G. W. Holdredge will be Assistant General Manager, with charge of all lines west of the Missouri; Mr. R. J. McClure will be Consulting Engineer for all the company's lines; Mr. George C. Smith, late Purchasing Agent, succeeding Mr. McClure as Chief Engineer of all lines east of the Missouri; Mr. John S. Cameron, Assistant to the General Manager, will hereafter be Assistant to the Third Vice-President.

Chicago, Danville & Vincennes.—At the annual meeting in Chicago, June 20, the following directors were chosen: J. W. Elwell, W. D. Judson, Daniel Dodd, A. T. Chur, E. C. Bogert, J. C. Rutter, and E. Walker.

Delaware, Maryland & Virginia.—An official circular gives the officers of this consolidated company as follows: President, N. L. McCready, No. 235 West street, New York; Vice-President and Secretary, W. H. Stanford, New York; Superintendent, Thomas Groom, Lewes, Del.; Traffic Manager and General Freight and Passenger Agent, A. Brown, Lewes, Del.; Treasurer, D. H. Houston, Lewes, Del.; Auditor, H. S. Marshall, Lewes, Del.; Engineer, John L. Mapes, Berlin, Md.

Ticket reports should be made to the General Passenger Agent, and matters relating to car service to the Traffic Manager.

Denver & Rio Grande.—Dr. F. J. Bancroft has been appointed Senior Surgeon for this company, with office at Denver, Col. He is assisted by local or district surgeons at all the principal points on the company's lines in Colorado, New Mexico and Utah.

Evansville, Washington & Brazil.—The directors of this new company are: Wm. Armstrong, J. C. Calhoun, O. S. Lyford, D. J. Mackey, D. R. Patterson, H. A. Rubidge. They are all connected with the Chicago & Eastern Illinois.

Massachusetts Railroad Commission.—The Governor of Massachusetts has appointed, and the Council confirmed, Mr. Everett A. Stevens, of Boston, to be a member of the Railroad Commission in place of Mr. Clemens Herschel, of Holyoke, whose term has expired. Mr. Herschel was the engineer member of the board.

Master Mechanics' Association.—At the annual convention in Chicago last week the following officers were chosen for the ensuing year: President, Reuben Wells, Louisville & Nashville; Vice Presidents, James Sedgley, Lake Shore & Michigan Southern, and J. D. Barnett, Grand Trunk; Secretary, J. H. Setchel, Ohio & Mississippi; Treasurer, George Richards, Boston & Providence.

New Brunswick.—Mr. E. R. Burpee is appointed General Manager of this company's lines, which now include the St. John & Maine. Mr. F. W. Cram has been appointed Superintendent. Mr. Cram, who was formerly Superintendent of the European & North American and is now General Eastern Agent of the Maine Central, has not yet finally accepted the new position offered him.

New London Northern.—Mr. C. F. Spaulding has been appointed General Superintendent in place of G. W. Bentley, resigned. Mr. Spaulding has been General Freight Agent for several years.

New York & New England.—The following circular from President J. H. Wilson is dated Boston, June 20: "Hiram

M. Kochersperger is hereby appointed Auditor of this company, vice Erastus Young, resigned to accept the auditorship of the Union Pacific Railway Co. All communications pertaining to the Accounting Department of the New York & New England Railroad should be addressed to Mr. Kochersperger, at 244 Federal street, Boston. This order will take effect July 1, 1883."

Norfolk & Western.—The following appointments have been made, to take effect July 1: E. E. Portlack, Auditor of Disbursements; Joseph W. Cox, Auditor of Receipts; Charles J. Eastwick, Cashier.

Pennsylvania.—The following changes are announced, to take effect July 1: Mr. W. J. Latta is appointed General Agent in Philadelphia, to succeed O. E. McClellan, transferred. Mr. Thomas Gucker (now Superintendent of the Eastern Division of the Philadelphia & Erie) succeeds Mr. Latta as Superintendent of the Philadelphia Division. Mr. O. E. McClellan, late General Agent in Philadelphia, is appointed Superintendent of the Middle Division, in place of H. M. Carter, transferred to the Philadelphia, Wilmington & Baltimore.

Pennsylvania, Slatington & New England.—At the annual meeting, June 21, the following directors were chosen: Edward T. R. Applegate, John Linn, John Loomis, George W. Mackey, Charles V. Moore, John W. Rutherford, Nathaniel S. Rue, Samuel M. Schanck, John F. Ward, Francis M. Ward, George M. Wright. At a subsequent meeting the board elected John F. Ward, President; Samuel M. Schanck, Secretary and Treasurer; J. C. Stanton, Jr., Secretary.

Philadelphia, Wilmington & Baltimore.—Mr. Henry M. Carter is appointed Superintendent of the Maryland Division of this road, and of the Baltimore & Potomac road, to date from July 1. Mr. Carter is now Superintendent of the Middle Division of the Pennsylvania Railroad.

Pittsburgh & Western.—President James Callery will hereafter act as General Manager also, in place of E. K. Hyndman, resigned.

Richmond & Allegheny.—The Richmond Circuit Court has appointed Decatur Axtell and Lawrence Myers Receivers of this road, in a suit begun by the second-mortgage bondholders.

St. Louis, Indianapolis & Eastern.—This company has been organized with the following officers: President, Charles Howard; Vice-President, T. A. Morris; Directors, John Caven, John D. Campbell, James Hazlett, Ellis Lawrence, E. V. Van Norman; Secretary and Treasurer, E. V. Van Norman. Office in Indianapolis.

St. Paul & Duluth.—At the annual meeting in St. Paul, Minn., June 19, the following directors were chosen: J. J. Hill, W. B. Langdon, A. Manuel, S. S. Merrill, Marvin Huggitt, P. M. Myers, W. H. Rhawn, James S. Smith, Jr., E. W. Winter. The board elected James S. Smith, Jr., President; W. H. Rhawn, Vice-President; Philip S. Harris, Secretary and Treasurer; C. Latham, Assistant Treasurer.

South Carolina Railroad Commission.—The Governor of South Carolina has appointed D. P. Duncan, of Union, Commissioner in place of Gov. Jeter, deceased. Mr. Duncan is a lawyer, and is also President of the State Agricultural Society.

Vermont Valley.—At the annual meeting on June 20, the following directors were chosen: J. H. Williams, Belows Falls, Vt.; Hugh Henry, Chester, Vt.; Frederick Billings, Woodstock, Vt.; John B. Page, Rutland, Vt.; Oscar Edwards, Northampton, Mass.; A. B. Harris, Springfield, Mass.; Henry C. Robinson, Hartford, Conn. The board re-elected A. B. Harris, President.

Wood County.—The directors of this new company are: J. N. Cameron, Vesper, Wis.; A. W. Patten, Neenah, Wis.; George Gerry, H. S. Gerry, J. P. Worten, Appleton, Wisconsin.

PERSONAL.

—Mr. F. T. Hawks, Assistant General Freight and Passenger Agent of the Virginia Midland road, died in Alexandria, Va., June 27, after a short illness.

—Mr. E. K. Hyndman has resigned his position as General Manager of the Pittsburgh & Western road. He remains General Manager of the Pittsburgh Junction road.

—Mr. Francis B. Wallace, for many years a member of the New York Stock Exchange and a well-known broker, died at his residence in New York, June 21, aged 76 years. He was for a number of years a director of the Long Island Railroad Co. and was a director and large stockholder in the old South Side Railroad Co. He was also a director of the Richmond & Danville Co. for a year past.

—Col. Wm. C. Patterson, for many years a prominent citizen of Philadelphia, died in that city June 20. He was born in East Tennessee in 1812, but at an early age removed to Philadelphia. When still a young man he entered into business on his own account and prospered, gradually accumulating a large fortune, much of which was invested in real estate. Col. Patterson was one of the first stockholders of the Pennsylvania Railroad Co., and was chosen one of the first board of directors. In 1849 he was chosen President of the company, and under his shrewd and careful management it was for the first time put upon a solid financial basis. He was not an engineer or a practical railroad man, but purely a man of business, and as such rendered the company great service at a time when it particularly needed a financier at its head. In 1852 he retired from the presidency, and was soon afterward made President of the Union Trust Co., holding that office until he retired from business altogether. Col. Patterson was for many years an active member of a militia regiment in Philadelphia; he saw active service in the Mexican war and in the early part of the late war.

—Mr. Charles L. Heywood, formerly Superintendent of the Fitchburg Railroad, was run over and killed by a freight train at Waltham, Mass., June 23, while he was endeavoring to warn a man who was in danger from a passenger train on the opposite track. He was so much engaged in this that he did not see or hear the train coming up behind him. Mr. Heywood was born in Lunenburg, Mass., and when still a boy entered the service of the Fitchburg road as gate-keeper at a crossing, and rose gradually to be brakeman, wood agent, Road-Master and Superintendent, retiring finally from that position in 1878, after serving the company for 38 years. At the time of his resignation he had a considerable fortune, but afterward lost heavily on some contracts which he undertook; at the time of his death he was in charge of the government cattle quarantine at the Waltham stock yards. Mr. Heywood served his company faithfully and, under a somewhat rough exterior, carried a warm and generous nature. When he owned a large house at South Acton he was wont to entertain large numbers of Boston poor children each year, and loved and was beloved of children. He was 55 years old and leaves a widow.

TRAFFIC AND EARNINGS.

Railroad Earnings.

Earnings for various periods are reported as follows:

Five months ending May 31:

	1883.	1882.	Inc. or Dec.	P. c.
Chl. & West Michigan	\$623,324	\$690,096	D.	\$12,772 2.0
Eastern	1,337,277	1,218,243	I.	119,034 9.8
Florida Transit	216,846	180,433	I.	36,413 20.2
Louisville & Nashville	5,277,329	4,905,403	I.	371,926 7.6
Net earnings	1,964,279	1,985,944	I.	12,565 0.6
Northern Central	2,488,450	2,121,592	I.	366,858 17.3
Net earnings	590,310	661,985	I.	71,675 10.8
Philadelphia & Reading	8,165,370	7,816,766	I.	348,604 4.3
Net earnings	3,416,395	3,041,542	I.	374,853 12.3
P. & E. Coal & Iron Co.	5,023,075	4,900,140	I.	122,935 2.5
Net earnings	53,781	188,350	D.	134,575 71.0
Richmond & Danville lines:				
Charlotte, Col. & Aug.	349,055	296,604	I.	52,451 17.7
Net earnings	167,032	74,512	I.	92,520 124.6
Columbia & Greenville	335,113	32,167	I.	302,946 939.9
Net earnings	131,190	6,806	I.	124,384 1828.3
Rich. & Danville	1,504,115	1,444,630	I.	59,485 4.1
Net earnings	700,359	435,091	I.	265,268 60.9
Virginia Midland	567,944	512,736	I.	55,208 10.8
Net earnings	229,037	146,351	I.	82,686 56.5
Western North Car.	123,103	78,710	I.	44,394 56.2
Net earnings	41,813	22,468	I.	19,345 86.2
South Carolina	577,044	517,748	I.	59,296 11.5
Month of April:				
Central, of New Jersey	\$968,682			
Net earnings	482,022			
Month of May:				
Buffalo, N. Y. & Phila.	\$225,656	\$102,206	I.	\$123,450 17.4
Net earnings	151,390	101,742	I.	49,648 32.1
Eastern	238,345	273,361	I.	35,016 14.7
Florida Transit	43,378	33,163	I.	10,215 23.9
Louisville & Nashville	1,655,000	1,658,130	I.	3,130 0.2
Net earnings	471,770	397,847	I.	73,923 18.8
Northern Central	440,132	465,695	I.	25,563 5.8
Net earnings	212,076	178,975	I.	33,101 18.5
Phila. & Reading	1,698,877	1,703,469	D.	4,592 0.3
Net earnings	768,787	760,833	D.	7,954 1.0
P. & E. Coal & Iron Co.	1,395,062	1,174,540	I.	220,522 18.8
Net earnings	15,494	19,441		
Richmond & Danville lines:				
Charlotte, Col. & Aug.	47,961	44,052	I.	3,909 8.9
Net earnings	8,949	2,691	I.	6,258 201.7
Columbia & Greenville	37,338	38,987	D.	1,649 4.3
Net earnings	55,577	9,706	I.	45,871 455.5
Rich. & Danville	297,287	293,380	I.	3,907 1.3
Net earnings	117,098	75,772	I.	41,326 54.5
Virginia Midland	137,736	119,234	I.	18,502 15.6
Net earnings	52,131	38,091	I.	14,040 36.9
Western N. C.	27,253	10,977	I.	16,276 152.1
Net earnings	1,582	1,031	I.	551 43.7
South Carolina	75,080	71,248	I.	3,832 5.3
Vicksburg, Shreveport & P.	2,448	2,823	D.	375 15.3
Second week in June:				
Chl. & Grand Trunk	\$51,949	\$37,496	I.	\$14,453 27.8
Ind., Bloom. & Western	53,414	45,048	I.	8,366 15.6
St. L. & San Francisco	58,410	58,100	D.	310 0.5
St. P. & Duluth	20,705	20,078	I.	6,227 30.1
Third week in June:				
Chl. & St. Paul	\$451,000	\$382,553	I.	\$68,447 17.9
Chl. & Northwestern	478,129	471,408	I.	6,721 1.4
Chl. & St. P. Min. & Oma.	102,290	89,400	I.	12,890 12.4
Denver & Rio Grande	155,300	121,900	I.	33,400 21.6
Louisville & Nashville	230,570	192,800	I.	37,770 19.6
Missouri Pacific lines	827,423	745,150	I.	82,273 11.0
Northern Pacific	185,100	164,410	I.	20,690 12.6
St. L. & San Francisco	61,200	53,700	I.	7,500 12.0

Second week in June:				
Chl. & Grand Trunk	\$51,349	\$37,498	I.	\$13,848 37.
Ind., Bloom. & Western ..	52,414	45,048	I.	7,366 16.4
St. L. & San Francisco	56,700	58,101	D.	1,400 2.4
St. P. & Duluth	26,705	20,078	I.	6,627 29.1
Third week in June:				
Chl. Mill. & St. Paul	\$451,000	\$392,553	I.	\$58,447 17.9
Chl. Northw. Pac.	178,129	174,484	I.	3,645 2.1
Chl. St. P., Min. & Oms.	102,900	83,400	I.	19,500 14.4
Denver & Rio Grande	155,300	121,900	I.	33,400 27.4
Louisville & Nashville	230,570	192,900	I.	37,670 16.4
Northwest Pacific Lines	827,423	745,151	I.	82,272 10.2
Northern Pacific	1,012,900	106,411	I.	29,879 12.6
St. L. & San Francisco	61,200	53,700	I.	7,500 14.0

gage in excess of the amount allowed for a single ticket are not unreasonable. Also that the refusal to accept as baggage sample trunks of over 250 lbs. weight is within the rights of the railroad companies and is not an unreasonable regulation. The Commissioners therefore decline to take any action in the matter.

Provision Exports in May.

The Bureau of Statistics reports the exports in May as follows, in pounds:

	1883.	1882.	Inc or Dec.	P. c.
Fresh beef.....	9,351,509	2,725,054	I. 6,626,455	243.2
Salt beef.....	2,512,015	1,976,884	I. 535,131	27.1
Tallow.....	4,707,886	4,756,780	I. 11,108	0.3
Butter.....	977,007	545,934	I. 431,133	79.0
Cheese.....	4,081,757	5,744,105	D. 1,662,348	18.5
Total cattle product.....	22,290,324	15,748,757	I. 6,541,567	41.5
Value.....	\$2,288,810	\$1,528,664	I. \$760,146	49.7
Bacon.....	15,605,806	21,224,910	D. 5,619,104	26.5
Hams.....	2,171,848	3,345,199	D. 1,173,351	7.4
Lard.....	14,812,348	13,870,712	I. 941,635	67.9
Pork.....	3,978,635	5,130,216	D. 1,151,581	22.5
Total hog product.....	36,568,727	42,571,038	D. 6,002,311	14.1
Value.....	\$3,976,605	\$4,626,351	D. \$649,746	14.0

The great increase in exports of cattle products is notable. It is chiefly in fresh beef, however, of which the exports were very light last year. The increase in value is even greater than that in quantity. In hog products there continues to be a decrease from the very small exports of last year, which was doubtless partly due to the high prices caused by speculation. The hog products usually enormously exceed in quantity and value the cattle products, but last May they were equal three-fifths of the quantity and a little less of the value.

For the five months ending with May the values of the provisions exported were:

	1883.	1882.	Inc. or Dec.	P. c.
Cattle products.....	\$11,275,804	\$9,514,785	I. \$1,761,019	18.4
Hog products.....	32,592,800	33,441,431	D. 848,631	2.6
Total.....	\$43,838,604	\$42,956,216	I. \$882,388	2.1

The increase in beef, tallow and butter has been about twice as great as the decrease in hog products, but the totals are still very small.

The Joint Executive Committee Rules Concerning Interchanged Passenger Traffic.

Vice-Chairman S. F. Pierson, of the Passenger Department of the Joint Executive Committee, has issued the following circular:

The following action was taken at the meeting of this committee in Chicago June 14, 1883:

"Resolved, That all lines west of the trunk lines parties to the Joint Executive agreement shall restore rates to tariff Sunday, July 1, 1883, and that prior to that date the Chairman shall notify all lines doing business within the territory of the roads members of the Joint Executive Committee of this action and of the rules of this Committee in regard to the conduct of passenger business, as provided for in Art. 11 of agreement in effect on and after March 1, 1883, which is as follows:

"Companies not parties to this agreement, but which desire to exchange or transact business with any of the companies parties hereto, shall be subject to the same rules and conditions and entitled to the same protection of their interests as companies parties hereto. Companies interchanging passenger traffic with lines parties hereto that may be ascertained to be making fares or paying commissions or taking other action inconsistent with the rules now agreed to or that may hereafter be agreed to, shall be advised of such rules and requested to conform to them within a specified reasonable time. Failing to respond or act upon such a request the lines parties hereto will protect each other and the revenues of their companies by declining to interchange passenger business with such roads until the cause of complaint is removed."

"Resolved, That violations of this agreement by parties to it or by roads outside of it shall be immediately reported, with the facts bearing upon the case, to the Chairman of the Committee at New York, who shall investigate the charges, and if they are sustained the penalty prescribed in Art. 11 of the agreement shall be at once applied."

"Resolved, That any tickets which may be purchased to procure evidence under this agreement shall be promptly redeemed at full tariff rates by the company issuing the same."

The roads controlled by the Pennsylvania Railroad Company in accordance with the above circular have given instructions to their ticket and passenger agents that on and after July 1 they will not be allowed to sell or offer to sell any ticket at less than regular tariff rate. They are also instructed that if they have reason to believe that any competing line is selling or offering to sell any ticket at less than tariff rates, they must procure positive evidence of the fact and report, competent evidence against a competitor being the purchase of one or more tickets at less than tariff rates, which should be forwarded promptly, together with a sworn statement of one or more responsible persons as to the transaction, rate paid, etc.

The Nickel-Plate Share of Chicago Live Stock Shipments.

Mr. Charles Francis Adams, Jr., to whom as Arbitrator was referred the appeal of the New York, Chicago & St. Louis road from his decision awarding it 10 per cent. of the Chicago live stock shipments, has affirmed his former decision and delivered the following opinion:

"This is a request for a rehearing of the award of April 7, in which a proportion (10 per cent.) of the live stock and dressed beef out of Chicago was assigned to the New York, Chicago & St. Louis, or Nickel-Plate Line, as a new competitor for that traffic. The award was, by agreement of parties, made in an irregular way, and with less than the usual consideration, with a distinct understanding that if any of the lines interested were not satisfied the matter could be reopened. The Nickel-Plate now asks that the matter be reopened, and that a larger portion of the traffic in question be assigned to it. The Michigan Central, the Pittsburgh, Fort Wayne & Chicago, and the Baltimore & Ohio roads meet this request with answers in which they concur in protesting against any increase of the Nickel-Plate allotment, and each of them further presents its reasons for thinking that it should contribute little or nothing to make up the share of the traffic which has been or hereafter may be allotted to the Nickel-Plate."

"I have considered the papers now presented very carefully, and given all the weight I could to the argument contained in them. The request of the Nickel-Plate is based on three distinct grounds. It is claimed that I took an erroneous view of the situation in making the Lake Shore the heaviest contributor to the Nickel-Plate allotment, when the Fort Wayne should have been the heaviest; that the allotment to the Nickel-Plate should not be less than that to the Fort Wayne; and that the divisions to equalize traffic presented in the table which accompanied the award of April 7 indicated that the existing allotments did not represent

the natural distribution of the traffic. In regard to the first of these three arguments it seems sufficient to say that it presents a wholly new view of the situation, and one which I do not think can be successfully maintained. According to it the Nickel-Plate line, however originally intended, will be found to be a positive advantage to the Lake Shore, through its tendency to concentrate east-bound traffic on the Toledo, Cleveland & Buffalo route. The other and more distant routes are those which suffer by its presence. This is a new theory as to the effect upon an existing line of the construction of a parallel competing line, and at first sight it does not commend itself to me as sound. The second argument is much more plausible. I can see no reason why, under similar conditions, the Nickel-Plate should not be as good a live-stock route as any out of Chicago. The difficulty is that the present conditions are not the same. There is nothing more difficult commercially than to divert any long established business from the channels in which it is accustomed to flow. This is true, not of railroads alone, but of banking, dry goods, newspapers and everything on a large scale. A new competitor starts in a field already occupied under heavy disadvantages. He can get his fair proportion of the business, but only very slowly, at great cost and with the utmost effort. The advantages the older concerns enjoy consist in their appliances and connections, the hold they have on business and the custom the public has got into of dealing with them. It is the good will of the trade. In this respect a railroad which has been in operation thirty years is necessarily much better placed than one just built. It has its hold on the traffic, which can only be shaken by degrees and by offering something better. If it comes to severe competition the business is cut to pieces, and this process generally results in a reduction of the profits of the old line and the bankruptcy and reorganization of the new one. This has been the familiar railroad experience. The new line works its way by degrees into a fair share of the traffic through a course of insolvency and receiverships. Under the apportionment and arbitration system the effort is to avoid this most wasteful method of reaching a result. But I do not think the old lines, which enjoy the good will secured by years of effort, would care to carry the principle to the extent of at once welcoming each new competitor to an equal share of the traffic. The Arbitrator must, therefore, if the parties cannot agree, estimate as best he can what proportion of the whole business the new-comer might reasonably expect at first to secure on equal terms, and decide accordingly. I did so in this case.

"I do not think it necessary to discuss the final Nickel-Plate argument. Apportionments, and the sustained rates which result from them, are not, as a rule, favored by shippers. Modern shippers also, especially of live stock, are not wholly unfamiliar with the methods through which agreements among railroads may be broken. They are quite equal to combining among themselves, and, as a rule, are not incompetent to look after their own interests. Any argument drawn from divisions ordered by the pool agents for the purpose of equalizing shipments would have to be received at least with hesitation. While disposed in this matter to give to the arguments of those representing the Nickel-Plate the most respectful consideration and all the weight I possibly can, I do not see that any sufficient reason for altering in its favor the award of April 7 has yet been presented. In regard to the representations contained in the answers of the other lines, it seems only necessary to say that the task of levying contributions to make up a new allotment is at best an ungrateful one. Unfortunately the total percentage remains the same, while the number of those among whom it has to be divided tends always toward an increase. It is rarely that the representative of any line comes forward and admits that his line should contribute. I fail to recall any case in which such a representative has expressed the opinion that his line has not been made to contribute enough. Under these circumstances I cannot say that the fact that a given award, as in this case, seems to elicit formal expressions of dissatisfaction from all quarters is in itself conclusive evidence of any mistake in it. On the contrary, it would seem to indicate that the contribution, like the resulting dissatisfaction, was not unevenly distributed. The present condition of affairs among the Chicago terminal roads is such that, in any event, a readjustment of percentages seems probable at a not very remote date, and under these circumstances I have been unable to see how the award of April 7 could now be improved upon. I am accordingly obliged to affirm it."

Rates Recommended on Dressed Beef.

Commissioner Fink has published his report upon the relative freight rates that should be maintained on dressed beef and live stock. After an exhaustive analysis of the testimony taken in April last from shippers of the two kinds of freight as to the cost of handling and the partial agreement on disputed matters reached at subsequent conferences of the trunk line managers, he sums up his recommendation as follows:

"Taking the lowest estimate which has been given by dressed beef shippers of the additional cost (beyond transportation charge) on live-stock shipments—namely, 15¢ cents per 100 pounds—and the highest estimate which has been made by the same parties of the additional cost of dressed beef shipments—namely, 27¢ cents per 100 pounds—the railroad transportation charge on dressed beef should be, if the rate on live stock is 40 cents, 70 cents per 100 pounds. Taking the highest estimate that has been made by parties interested in shipping live stock as to the additional cost of live stock shipments—say 19¢ cents—and the lowest estimate which has been made by the same parties in regard to the additional cost of dressed beef shipments—namely, 18¢ cents—the railroad charge would be 96¢ cents on dressed beef from Chicago to New York. An average of these two estimates is 78¢ cents, while the estimate recommended by me is 77 cents."

The railroads have yet to accept the recommendation of the Commissioner, and before any agreement is reached there are many points of dispute to be settled, which may modify the proposed rate of 77 cents on dressed beef.

OLD AND NEW ROADS.

Albany & Raleigh.—A vote taken in the town of Raleigh, N. C., June 23, upon the question of subscribing \$50,000 in aid of this road resulted in the defeat of the subscription by a small majority.

Baltimore & Ohio.—The Pittsburgh Telegraph of June 25 says: "The Streets Run Branch of the Baltimore & Ohio will be connected with the Washington Branch at Cochran's mills on Thursday next, and will be open for freight traffic on July 14 and for passenger trains on Aug. 1. This cut-off will enable the Baltimore & Ohio to save nearly 300 miles between Pittsburgh and Wheeling. Heretofore the company has had to run the freight to Cumberland, 150 miles, and thence over the mountains to Wheeling, 209 miles. The cut-off places Wheeling 64 miles from

this city and avoids two mountain trips. The road starts at the mouth of Streets Run on the Monongahela, opposite Glenwood, which is within the city limits and follows the Streets Run Valley, Lick Run Valley and Peters Creek Valley to Finleyville, where it intersects with the old part of the Pittsburgh Southern, the gauge of which has been broadened from that point into Washington. At this point the road connects with the Hempfield Branch of the Baltimore & Ohio to Wheeling and thence connects with its lines west of the river. This gives Pittsburgh a new northwest and southwest outlet.

"It is officially announced that the Baltimore & Ohio Co. will soon begin the erection of substantial and elegant depot buildings on the site of the present inadequate structures. The passenger depot now in use was originally part of the glass works of Bakewell, Pears & Co., and was subsequently the variety works of Jones & Wallingford. President Garrett before going to Europe gave orders for the construction of the double track iron truss bridge at Glenwood, and the work on its foundations will commence within 30 days. It will be an all railroad bridge, and without accommodations for foot passengers and vehicles, and will do away with the transfer from the Baltimore & Ohio proper to the new line by water."

Batavia, Albion & Lake Ontario.—This company has been organized to build a narrow-gauge road from Batavia, N. Y., by Albion to Oak Orchard Harbor, on Lake Ontario, a distance of about 30 miles.

Birmingham & Memphis.—This company has been incorporated to build a railroad from Birmingham, Ala., to Memphis, Tenn., about 240 miles. The incorporators are J. D. Bealle, H. E. Faber, Gordon McDonald, C. L. Sayre, H. C. Tompkins, David Weil and others, chiefly residents of Birmingham.

Boston, Revere Beach & Lynn.—This company voted at a special meeting held June 21 to increase the capital stock from \$500,000 to \$650,000. The additional stock will be used to fund the floating debt.

Central Iowa.—The executive committee chosen at a meeting of the holders of preferred securities of the Central Iowa, in Boston, April 4, has made a report to the effect that the managers of the road have been using the whole net earnings or profits of the road in extensively improving it, by putting down steel rails and in many other ways, according to their best judgment, in view of the increasing business of the road and its future possibilities, and the committee is disposed to concede honesty of intention in the management of the road, while it charges gross carelessness of the rights guaranteed to preferred stockholders by the charter. In regard to the present year (1883), the committee have the assurance of the President that a dividend will be paid to some or all the preferred security holders of the road out of the surplus net earnings. In view of these facts, the committee recommends that the claims of the junior preferred stocks be held in abeyance, and that the holders of debt certificates and of preferred stocks should accept (if voted them by the directors) dividend scrip of 7 per cent. in full of all claims for net earnings of the road to January 1, 1883.

Central Pacific.—General Manager A. N. Towne recently submitted the following statement to the Railroad Commissioners of California:

"I submit herewith the annual report of the Central Pacific Railroad Co. for the year ending Dec. 31, 1882, according to the forms prescribed by your honorable Board, which is subscribed and sworn to by the proper officers of this company. I also inclose a comparative statement of the increase, traffic, rates, etc., of the Central Pacific Railroad and leased lines for the years 1881 and 1882, the items of which are referred to by page numbers to the above report."

"In view of the consideration by your honorable Board of the regulation of charges for the transportation of passengers and freight on the roads operated by this company in California, I beg to call your attention to this statement and particularly to the following items, which show the result of the operations of the system of roads operated by this company during the past year:

The miles of road operated were:

On Dec. 31, 1881..... 2,865.75

On Dec. 31, 1882..... 3,201.88

An increase during the year of..... 336.13

The total amount available for dividends was:

For the year 1881..... \$4,893,757.13

For the year 1882..... 3,591,941.93

A decrease in 1882 of..... \$1,302,115.20

"This great decrease of net income, amounting to 27 per cent., was caused partly by renewal and improvements to property, but to a much larger extent was due to the increase of traffic at lower rates. This is shown by the following figures: The average rate of freight per ton per mile was, in 1881, 2.16 cents; in 1882, 1.81 cents, a decrease in 1882 of 16 per cent. or 0.35 cent on each ton hauled one mile.

"The average rate of fares per passenger per mile was in 1881, 3.06 cents; in 1882, 2.92 cents, a decrease in 1882 of five per cent. or 0.44 cent on each mile traveled by a passenger.

"The tons of freight carried one mile were:

In 1881..... 733,285,889

In 1882..... 902,981,309

Increase in 1882 of..... 169,695,420

The number of passengers carried one mile was:

In 1881..... 218,117,760

In 1882..... 255,824,363

Increase in 1882 of..... 37,706,603

"A large portion of the expenses of this, as of all railroad companies, are of a fixed character, so that they are little affected by an increase or decrease of traffic. A greater traffic may therefore be carried on at a lower rate and still with a larger profit to the company, as the increase of expenses is not in as great a ratio as the increase of receipts.

"Following the policy which is generally understood by those who are familiar with the subject of transportation to be to the interest of the company as well as to the shipper, this company has used every effort to increase its traffic at lower rates, hoping thereby to increase its means as well.

"Unfortunately for the company, however, during the year 1882 (though better results are hoped for in the future) the increase of earnings was more than overcome by the increase of expenses.

"The net earnings per freight train mile were, in 1881, \$1.53. In 1882, \$1.13, a decrease in the net profit on each mile run by freight trains of 40 cents, or 26 per cent.

"The net earnings per passenger train mile were, in 1881, \$1.49; in 1882, \$1.38; a decrease in the net profit on each mile run by passenger trains of 11 cents, or 8 per cent.

"As a result, the foregoing shows that in 1882, compared with the previous year, the roads operated by this company performed a service of 23 per cent. more in freight traffic and 17 per cent. more in passenger traffic, at a total net profit to the company of 27 per cent. less."

Charlotte, Columbia & Augusta.—At a meeting held in Columbia, S. C., June 27, the stockholders voted to authorize the issue of \$3,500,000 new 6 per cent. bonds, to be secured by a consolidated mortgage on the road. Of these bonds \$2,698,000 will be reserved to take up or replace the present bonded debt, and the remaining \$802,000 will be used as required to complete the renewal of the road with steel rails and make other improvements.

Chicago, Milwaukee & St. Paul.—The old suit of Wm. Barnes and others to set aside the foreclosure sale of the old La Crosse & Milwaukee road in 1859 is before the United States Circuit Court in Milwaukee this week on a motion to approve the Master's report, which was in favor of the bondholders.

Cincinnati, New Orleans & Texas Pacific.—This company, having shown that over \$600,000 have been expended on improvements of the road since it took possession, the Cincinnati Southern trustees have voted to release to it the remaining \$100,000 of the bonds deposited as security for the making of such betterments at the time of the lease.

Cleveland, Columbus, Cincinnati & Indianapolis.—The following statement for the three months ending March 31 is published in London:

	1883.	1882.	Increase.	P. c.
Earnings.....	\$1,000,736	\$857,557	I. \$143,179	16.7
Expenses.....	708,219	686,590	I. 21,629	3.2
Net earnings.....	\$292,517	\$170,967	I. \$121,550	71.2
Fixed charges.....	242,061	216,217	I. 25,844	11.9
Surplus or deficit.....	\$50,456	\$54,750	D. \$4,294	8.3

The expenses were 70.76 per cent. of gross earnings this year, against 80.10 per cent. last year.

Consolidated Railroad Co., of Vermont.—The time for depositing Vermont Central bonds and Vermont & Canada stock for exchange for the securities of the new Consolidated Railroad Co. expired June 20. The American Loan & Trust Co., of Boston, the depository, reports that nearly all the holders of the securities have deposited them and agreed to the plan of reorganization.

Delaware, Maryland & Virginia.—An official circular from this company says:

"The Junction & Breakwater, the Breakwater & Frankford and the Worcester Railroad companies having been consolidated on June 1, will hereafter be known as the Delaware, Maryland & Virginia Railroad Co., and all communications, reports, etc., should be so addressed."

East Tennessee, Virginia & Georgia.—At the special meeting in Knoxville, Tenn., June 23, the following resolution was adopted:

"Resolved, That the stockholders of the East Tennessee, Virginia & Georgia Railroad, in convention assembled, hereby authorize and empower the directors of the company to construct, equip or purchase such extensions and branches as they may decide upon, and to lease upon such terms and with such guarantees as they think best, any lines of road belonging to other companies, necessary, in the judgment of the directors, to the perfecting of the system of this company; and for such purpose, as well as for any other corporate use, the board of directors of the company are hereby authorized and empowered to increase the common stock of the company to the gross sum of not to exceed \$35,000,000 and the preferred stock to the gross sum of not to exceed \$25,000,000; and also to execute and issue, as far as necessary, a series of 10,000 first mortgage bonds of \$1,000 each, bearing 6 per cent. interest per annum, payable semi-annually, dated July 1, 1888, and due 50 years from date, payable in gold coin, and to secure the same by first mortgage on all extensions, branches and other property acquired by the proceeds of said stock and bonds, said bonds and mortgage to be of such form as the directors may decide upon."

The meeting recommended additional terminal facilities at Rome, Ga.

A resolution was adopted recommending the transfer of the company's interest in certain coal lands to the corporation known as the Consolidated Coal Co.

It will be seen that the board of directors is thus invested with extraordinary powers. Just what the board is to do is not announced, but it is understood that the object is to consolidate the Memphis & Charleston with the company, and possibly to acquire another line to the Mississippi River; also to build an extension of the Georgia Division to Jacksonville, Fla., and finally to make connections and complete close relations with the Missouri Pacific system by lease or agreement. It is generally believed that a large part of the interest in the road owned by the Seney syndicate has been sold to Mr. Jay Gould, and that he will control the company hereafter.

There are also reports, not authenticated as yet, that the company will purchase a controlling interest in some of the lines now owned by the Erlanger syndicate, which is said to be anxious to sell out.

East & West, of Alabama.—Nearly all the grading is now done on the section of this road from the crossing of the Selma Division of the East Tennessee, Virginia & Georgia road westward to Broken Arrow, Ala., about 40 miles, and the track has been laid for 15 miles. Work is well advanced on the bridge over the Coosa River, and the erection of the superstructure will be begun as soon as the track reaches the river. It is expected that the track will be laid by Sept. 1, when work will be begun from Cedartown, Ga., westward.

Evansville, Washington & Brazil.—This company has been organized to build a railroad from Brazil, Ind., to Sandy Hook, on the Indianapolis & Evansville road, a distance of 65 miles. The organization is controlled by the Chicago & Eastern Illinois.

Floods in the Mississippi.—The extraordinary June rise in the Missouri and its tributaries, which last week did great damage to railroad and other property all along the river from Omaha to Kansas City, almost completely stopping railroad traffic for a time, has this week reached the Mississippi, and is overflowing all the low lands from the mouth of the Missouri down. The chief damage done so far has been at East St. Louis, and the adjoining towns of Venice and East Carondelet, where there is a great amount of railroad property concentrated. For several days all the lines into St. Louis from the east have been under water, and most of them have suffered severely from wash-outs and other destruction of property by the floods, besides the interruption to traffic thus caused.

Florida Transit.—It is reported that Mr. Jay Gould has bought a large interest in this road, and that connection will be made with the East Tennessee, Virginia & Georgia system by a line from Fernandina, Dr. Hart's road, to some point near Jesup, Ga., on that company's Macon & Brunswick line.

Gainesville, Jefferson & Southern.—The contracts for the extension of this road from Jug Tavern, Ga., to Monroe have been let to Messrs. Blackstock, Lewis and H. D. Jackson. The grading is to be finished to Monroe by Nov. 1 and the track laid by Dec. 1 next.

Georgia Pacific.—Track has been laid from Irondale, Ala., eastward 5 miles, and work is progressing steadily toward the Coosa River.

A location has finally been decided on for the line from Birmingham, Ala., west. The Milner Coal road, recently bought by this company, will be used to Coalburg, 10 miles, and the road will then follow Five-Mile Creek for some distance. Work on the grading will be begun very soon.

Georgia Railroad Commission.—A dispatch from Atlanta, Ga., June 27, says: "The Railroad Commission to day issued several circulars, one of which is of general importance as indicating the tendency of the Commission to take control of details. By this circular it is ordered that each railroad company in this state, at each freight station, shall provide, on or before September, ample and suitable depot or shed-room for the reception and protection from damage by weather of any merchandise that may be offered for immediate shipment over their respective routes. Where depot-room is not now sufficient for this purpose, the erection of suitable sheds is ordered, to be properly floored, roofed and inclosed on the sides. This order is peremptory, and is regarded by many railroad managers as tyrannical, but the Commission is firm and the people approve its action."

Grand Rapids & Indiana.—Notice is given to the holders of coupons maturing July 1, that the Pennsylvania Railroad Co. will purchase said coupons, as the Grand Rapids & Indiana Co. cannot pay them while enjoined by the suit in equity.

Green Mountain.—This road has been completed in time for the summer business, and will shortly be opened. It is a little over a mile long, running from the foot to the summit of Green Mountain on the island of Mt. Desert, on the coast of Maine. It rises nearly 1,500 ft., the grade being one in four, and at some points one in five. It is built with a third rail or rack, on the same plan as the Mt. Washington Railroad, and the equipment is also on the same pattern as that in use at Mt. Washington. It will be used in the summer only. It is owned chiefly in Bangor.

Harrisburg & Western.—The Pittsburgh Telegraph of June 22, says: "Among the prominent railroad men in the city last evening was Oliver W. Barnes, of New York, an old Pittsburgher, who was chief engineer of important railway construction hereabouts years ago. He said relative to the new Vanderbilt line, the Harrisburg & Western, that the road leaves Harrisburg where it connects with the Philadelphia & Reading going east, and runs in a direct line 100 miles to Bedford, thence to Somerset, to near Mt. Pleasant and down the Big Sewickley Valley to its mouth, when it intersects the Pittsburgh, McKeesport & Youghiogheny Railroad, 29 miles from Pittsburgh, thus forming a line from Harrisburg to Pittsburgh 229 miles in length. This route is the one chosen, and will be adopted by the board of directors. It is proposed to extend a branch from a point east of Mt. Pleasant and thence via Connellsville direct to Wheeling. The road will cross the Chartiers & Youghiogheny by an overhead bridge in the Big Sewickley Valley. Two overhead bridge crossings of the Southwest Pennsylvania will be made, one near Mt. Pleasant and the other near Paintersville, Westmoreland County. The only bridge of extraordinary magnitude will be the one at Harrisburg, crossing the Susquehanna. This bridge has not been contracted for, as published, and instead of costing \$2,000,000, it will cost but \$500,000. It will be an iron truss of the latest improved pattern, and the contract for its construction will be let in the fall."

"Ten tunnels will be constructed, some of them unusually large. The first is the Blue Ridge, 25 miles west of Harrisburg, 4,350 feet long; second, one mile west of the Blue Ridge, the Kittatinny tunnel, 4,635 feet; third, Tuscarora tunnel, 5,290 feet; fourth, Sidling Hill tunnel, 6,300 feet; fifth, Ray's Hill tunnel, 3,700 feet; sixth, Alleghany Mountain tunnel, 5,900 feet; seventh, Negro Mountain tunnel, 1,800 feet; eighth, Quemahoning tunnel, 2,000 feet; ninth, Laurel Hill tunnel, 5,300 feet; tenth, Sewickley tunnel, 1,800 feet. The general maximum grade going east is 52 ft. to the mile, but a large proportion of the road is on grades of 26 ft. to the mile. The ascent of the eastern slope of the Alleghany Mountains will be made with a grade of 95 ft. to the mile on tangents, reduced on curves in proportion to the rate of curvature in such manner as to make the curves equivalent to straight lines. The rate of grade is the same as that used on the Pennsylvania Railroad in the ascent from Altoona to the summit of the Alleghenies, and is the same in length, 10 miles. The right of way for nearly the whole line has been obtained, and generally by free releases from the land owners. No serious difficulty has been encountered in this respect. The company has secured a tract of land on the west side of the Susquehanna, opposite Harrisburg, known as the Walton farm, containing 245 acres, for terminal facilities. At other points along the line ample grounds for station purposes have been secured. When shops are required they will be erected at Harrisburg. The road is to be built in the best manner with double track, 70-pound steel rails and every known improvement."

"The contracts will be let on Sept. 1 and work begin immediately thereafter. Two years will finish the line, and it is expected \$100,000 per mile will be expended. The P. M. & Y. will furnish terminal facilities in this city. The Monongahela River is recrossed within the city limits, and then, over another line, the passenger depots are reached. The bridge referred to within the city will be the Junction, and it seems evident that the Pittsburgh East End line will be used to reach a passenger depot at Grand street and Sixth avenue."

Hoosac Tunnel.—The Railroad Committee of the Massachusetts Legislature has reported a bill for the sale of the Hoosac tunnel and state railroad which incorporates A. H. Rice, F. L. Ames, W. B. Stearnes, R. Codman, E. H. Baker, T. F. Ware, W. H. Lincoln, F. G. Fessenden, F. C. Welch, G. F. Fay, C. C. Dodge, E. F. Pratt and others as the Hoosac Tunnel Railroad Co. This corporation may purchase the Fitchburg and Vermont & Massachusetts railroads, or may lease for a term not less than 99 years; they may also purchase the Troy & Greenfield Railroad and Hoosac tunnel of the state for not less than \$7,000,000 in cash, or in 5 per cent. 20-year bonds. The Governor and Council are authorized to sell on these terms. The contract of sale shall protect the right of connecting railroads under the public statutes, to exchange freight and passengers upon the same terms and without discrimination, the tunnel to be reckoned in mileage charges as three times the same length of ordinary road. The Hoosac Tunnel Railroad consolidation is authorized to form connections with a completed line to Lake Erie, and to issue capital stock amounting to \$75,000 per mile of double-track road owned by it in this state, or to \$40,000 per mile of single track.

Hudson Tunnel Railroad.—Work has been begun on the south tunnel under the Hudson River on the New York side; the north tunnel is now out 170 ft. On the Jersey City side the north tunnel is now out 1,600 ft., and the south tunnel 600 ft. The north tunnel is thus finished for 1,770 ft., or nearly one-third of the distance between the

shore shafts. Nothing has yet been done as to the approaches on either end.

Some complaint has been made by owners of vessels using the piers near the New York end of disturbance of the river bottom by the occasional escape of compressed air from the tunnel works.

Jacksonville Southeastern.—The contract for grading the extension of this road from the present terminus at Smithboro, Ill., southeast to Centralia, about 80 miles, has been let to Langworthy & Collins, of Quincy, Ill., who have already begun work.

Jersey Shore, Pine Creek & Buffalo.—The opening excursion over this road, which was to have taken place June 26, has been postponed on account of the violent storms of last week, which have caused several wash-outs along the line.

Kentucky Central.—Track on the extension of this road is now laid to Richmond, Ky., 39 miles southward from Paris. At Richmond connection is made with the Richmond Branch, operated by this company, over which connection is made with the Louisville and Nashville at Richmond Junction, 34 miles distant from Richmond. By this route connections can be made through to Knoxville, although the extension will not be completed to Livingston, its terminus, for some months yet. The road runs through the blue grass region all the way. Midway between Winchester and Richmond it crosses the Kentucky River on a bridge 550 ft. long and 85 ft. high. Regular trains will begin running July 2.

Lake Erie & Western.—It is said that negotiations are in progress for a sale of the controlling interest in this road to Mr. Vanderbilt, and its operation by the Cleveland, Columbus, Cincinnati & Indianapolis Co. under lease. The interest is now owned by Messrs. Seney, Brice and others, who are very willing to sell. The road extends from Sandusky, O., to Bloomington, Ill., and has not been a very valuable property, being dependent largely on through business, which must be carried at low rates.

The latest reports are that the negotiations depend chiefly upon Mr. Vanderbilt's willingness to include in the purchase the Peoria, Decatur & Evansville, which is owned by the same parties.

Lake Shore & Michigan Southern.—The following statement is made for the half year ending June 30, the June earnings and expenses partly estimated:

	1883.	1882.	Incr. or Dec.	P. c.
Earnings.....	\$9,310,616	\$7,952,721	I. \$1,357,895	15.8
Expenses.....	5,608,779	5,359,076	I. 249,703	4.5
Net earnings.....	\$3,541,837	\$2,593,645	I. \$948,192	36.6
Interest, rentals, etc., 1,800,000		1,516,950	I. 283,050	15.6
Surplus.....	\$1,741,837	\$1,076,695	I. \$665,142	61.9
Per cent. of exps.....	61.55	67.35	D. 5.80

The Treasurer's statement says: "The property has been kept up to its usual high standard, and the cost of doing it has been charged to operating expenses. Nothing has been charged to construction account."

"If the last half of 1883 yield as good results as the same period of last year (\$6.20 per share), the whole year will show an earning of 9 1/2 per cent."

The net earnings this year were equal to 3.52 per cent. on the stock, against 2.17 per cent. last year. A quarterly dividend of 2 per cent. was paid May 1, and another dividend of 2 per cent. is now declared, making 4 per cent. in all for the half year, and requiring \$1,978,660, showing a deficit of \$236,823 for the six months, against a deficit of \$902,565 last year.

Long Island.—This company has recently negotiated the sale of an additional \$1,000,000 of its 5 per cent. consolidated mortgage bonds, completing the issue of those bonds. Officers of the road say that sufficient money has been realized on these first mortgage consolidated bonds to refund the entire indebtedness, pay for relaying the track with steel rails, widen the gauge of the Manhattan Beach Division, and purchase additional rolling stock. It is announced that hereafter all dividends on stock and interest on bonds held in Europe will be paid in London.

Louisville & Nashville.—This company makes the following statement for May and the eleven months of the fiscal year from July 1 to May 31:

	May—1883.	May—1882.	Eleven months—1882-83.	Eleven months—1881-82.
Earnings.....	\$1,055,000	\$958,130	\$12,136,859	\$10,772,253
Expenses.....	583,230	563,283	7,467,511	6,545,361
Net earnings.....	\$471,770	\$394,847	\$4,669,348	\$4,226,892

For the eleven months there was an increase of \$1,364,606, or 12.7 per cent., in gross earnings; an increase of \$922,250, or 14.1 per cent., in expenses, and an increase of \$442,356, or 10.5 per cent., in net earnings.

Michigan Central.—The following statement is made for the six months ending June 30, the June earnings and expenses partly estimated:

Gross earnings.....	\$6,740,000
Expenses (68.26 per cent.).....	4,591,000
Net earnings.....	\$2,149,000
Interest and rentals.....	1,210,000
Surplus for the half year.....	\$939,000

No comparison is made with 1882, as the earnings, expenses, etc., this year includes those of the Canada Southern, which was not operated by this company last year.

Under the agreement the surplus for the half year is divided, the Michigan Central receiving two-thirds, or \$626,000, being equivalent to 3.34 per cent. on the stock. From this a dividend of 3 per cent. is declared for the half year, which will require \$562,146, leaving a balance of \$63,854. The Canada Southern receives under the agreement one-third of the surplus, or \$313,000, which is equal to 2.09 per cent. on the stock. From this surplus a dividend of 2 per cent. is declared, which will require \$300,000, leaving a balance of \$13,000 for the half year.

Missouri Valley & Blair.—This company, which has been building the bridge over the Missouri River at Blair, Neb., has issued \$1,000,000 first mortgage 6 per cent. bonds, which are guaranteed by the Sioux City & Pacific, the Cedar Rapids & Missouri River, the Chicago, Iowa & Nebraska, and the Chicago & Northwestern companies. These bonds have been placed at 102 1/4 to 105, chiefly in Boston.

New Brunswick.—This company takes possession of the St. John & Maine road July 1, under the lease lately concluded, thereby completing its control of all the lines in the province of New Brunswick east of the Intercolonial system, excepting the Grand Southern road. It is stated that the leased line will be laid with steel rails, and that other improvements will be made.

New York & Long Branch.—A dispatch from Trenton, N. J., June 21, says: "A few weeks ago the Pennsylvania Railroad Co. filed a bill in the United States Circuit Court, in this city, setting forth that an agreement had been

entered into between it and the Central Railroad of New Jersey by which the Pennsylvania was permitted to run trains over the New York & Long Branch road to the seashore. In this agreement, it is alleged, it was also stipulated that no Superintendent for that division of the Central Railroad should be appointed without the concurrence of the Pennsylvania Railroad. The bill further stated that the complainants had received notice that the Central Railroad Co. would no longer abide by the contract, and concluded by praying for an injunction order restraining the Central Railroad Co. from abrogating the said contract or taking any action whatsoever in the matter. The Court issued a temporary order to that effect, and fixed June 25 as the day on which to hear the arguments in the case. By consent of counsel the hearing has been postponed until July 9.

"Late last evening Mr. Edward T. Green, counsel for the Pennsylvania Railroad Co., filed a petition asking for a rule to show cause why the Court should not appoint a proper person to act as Superintendent of the New York & Long Branch Railroad, and that the said road be managed and operated under the direction of the Court. Judge Nixon granted the rule and made it returnable on June 28. In the meantime affidavits may be taken preliminarily for the argument. The petition sets forth the stipulation above recited, concerning the appointment of a Superintendent with the consent of both parties; and further, that upon the resignation of Mr. Randolph, the late Superintendent of the New York & Long Branch Railroad, the President of the Central Railroad Co. filled the place by the appointment of another without consulting the Pennsylvania Railroad Co. This act, the petition claims, is a violation of the injunction issued by the Court in the suit still pending against the Central Railroad Co., and also that the President of the Central Railroad Co. is in contempt of court."

New York Northern.—This company has filed articles of incorporation to build a railroad from Waverly, N. Y., by Trumansburg, Ovid, Waterloo, Seneca Falls and Clyde to Sodus Bay, on Lake Ontario, a distance of about 90 miles. It is proposed to use the road-bed graded more than ten years ago for the Pennsylvania & Sodus Bay road. The incorporators are John B. Alley, Wm. Anway, Edward Jordan, Joel A. Sperry and Solomon T. Streeter.

New York, West Shore & Buffalo.—The following circular from General Passenger Agent Henry Monett is dated New York, June 20:

This line will be opened for passenger business between New York and Kingston on the 25th inst. Connections will be made at Union station, Kingston, with express trains on Ulster & Delaware Railroad for all points in the Catskill Mountains. Through single and round trip tickets will be sold, and baggage checked to all principal points reached via the Ulster & Delaware, Stony Clove & Catskill Mountain and Katerskill railroads. New York passengers will arrive and depart via Desbrosses street and Cortlandt street ferries. Brooklyn passengers will arrive at and depart from the foot of Fulton street, via Brooklyn Annex Ferry. Passengers from Philadelphia and the West or South will connect with trains via West Shore Route, in the Pennsylvania Railroad Station, Jersey City, thus avoiding a long, tedious transfer through New York City.

Northern Central.—This company makes the following statement for May and the five months ending May 31:

	1883.	1882.	Five months—1883.	Five months—1882.
Earnings.....	\$499,133	\$465,695	\$2,488,450	\$2,121,892
Working expenses.....	266,037	273,412	1,369,694	1,324,676
Extraordinary exps.....	21,020	13,308	199,444	133,251
Total.....	\$287,057	\$286,720	\$1,569,140	\$1,457,927
Net earnings.....	\$212,076	\$178,975	\$889,310	\$663,965

For the five months there was an increase of \$346,558, or 16.3 per cent., in gross earnings; an increase of \$45,018, or 3.4 per cent., in working expenses; an increase of \$66,195, or 4.9 per cent., in extraordinary expenses; an increase of \$111,218, or 7.6 per cent., in total expenses, and an increase of \$235,345, or 35.4 per cent., in net earnings.

Northern Pacific.—The tracklayers working east have reached Missoula, Mont., 273 miles from Wallula Junction and 633 miles from Portland. On the gap of 116 miles between Missoula and Helena the grading is now substantially all finished and several of the bridges are already in place, while work is in progress on the others.

Ontario & Pacific.—This company has let a contract to L. M. Shute, of Philadelphia, to build some 600 miles of road, extending all the way from Cornwall on the St. Lawrence to the St. Lawrence. The contract, however, is contingent upon the sale of the bonds of the company, of which \$12,000,000 are authorized.

Ottawa & Gatineau Valley.—This unfinished Canadian road has, it is said, been sold to parties from the United States who are interested in iron mines on the line. Contracts for building the road have been let at \$16,000 per mile.

Pennsylvania.—The Pittsburgh Railway Reporter says: "Under an agreement between the Pittsburgh & Western Co. and the Pennsylvania Railroad Company for itself, and as lessee of the Western Pennsylvania Railroad, for the revision of location and joint use of tracks west of Pine Creek, for the privilege of using the track of the West Penn Road from Millrate to Pine Creek, the Pittsburgh & Western gave the former the right to use their tracks down as far as Jack's Run." This closes a troublesome local dispute between the two companies, which has been in progress some time.

The issue of \$5,000,000 new 4½ per cent. collateral trust bonds is offered for subscription by Drexel & Co., of Philadelphia; Drexel, Morgan & Co., New York, and J. S. Morgan & Co., London. The bonds have 30 years to run. Subscriptions will be received at 97½ from July 2 until further notice.

Philadelphia & Reading.—The following circular has been issued by General Manager J. E. Wooten: "The Shamokin, Sunbury & Lewisburg Railroad, between Shamokin and West Milton, will be opened for business on July 2, 1883. It will be known as the Shamokin, Sunbury & Lewisburg Branch of the Philadelphia & Reading Railroad, and will be operated as part of the Mahony & Susquehanna Division."

It is announced that the \$1,000,000 new Shamokin, Sunbury & Lewisburg 5 per cent. first-mortgage bonds offered for sale by this company have all been taken at from 95 to 98, the bids received exceeding the amount offered.

Notice is given that the Railroad Co. and the Coal & Iron Co. will resume cash payments at maturity of coupons and interest upon all direct obligations or guarantees of both companies maturing on and after July 1, 1883. Holders of deferred coupon dollar scrip will be entitled, on and after July 2, 1883, to receive cash for all back interest to July 1, 1883, inclusive, and the principal of the scrip will be stamped interest paid to July 1, 1883, and payment of the principal extended at 6 per cent. to July 1, 1884. Holders of coupons matured prior to July 1, 1883, upon any direct obligations of or bonds guaranteed by either company will

be entitled to convert the same into first series 5 per cent. consolidated mortgage bonds of the Philadelphia & Reading Railroad Co. at par.

This company's statement gives the following figures for May and the six months of the fiscal year from Dec. 1 to May 31:

	May—1883.	May—1882.	Six months—1883.	Six months—1882.
Railroad Co.				
Earnings.....	\$1,696,877	\$1,703,469	\$9,950,742	\$9,667,655
Expenses.....	1,028,090	942,536	5,693,738	5,755,502
Net earnings.....	\$668,787	\$760,933	\$4,255,004	\$3,912,153
Coal & Iron Co.				
Earnings.....	\$1,395,052	\$1,174,540	\$6,692,904	\$6,349,028
Expenses.....	1,408,549	1,154,599	6,633,949	6,094,041
Net earnings.....	\$*13,497	\$19,941	\$58,955	\$255,287
Both companies:				
Earnings.....	\$3,091,929	\$2,878,009	\$16,643,646	\$16,017,583
Expenses.....	2,436,639	2,097,135	12,327,687	11,850,543
Net earnings.....	\$655,290	\$780,874	\$4,315,959	\$4,167,440

* Deficit.

The Railroad Co. shows for the half year a small increase in earnings—\$283,087, or 2.9 per cent.—with a small decrease in expenses—\$59,784, or 1.0 per cent.—the two together making up an increase in net earnings of \$342,851, or 2.7 per cent.

The Coal & Iron Co. had a fair increase in earnings—\$342,976, or 5.4 per cent.—accompanied with a large increase in expenses—\$539,308, or 8.8 per cent.—the result being a net decrease of \$196,332, or 77.0 per cent.

For the two companies the result of the half year is an increase of \$626,063, or 3.9 per cent., in gross earnings; an increase of \$479,544, or 4.0 per cent., in expenses, and an increase of \$146,519, or 3.5 per cent., in net earnings.

The coal carried over the railroad and mined from the Coal and Iron Co.'s lands was as follows:

	May—1883.	May—1882.	Six months—1883.	Six months—1882.
Tons coal on R.R.....	665,823	644,165	3,892,382	3,602,529
Tons coal mined.....	435,503	418,098	2,514,902	2,337,458

The expenses in the statement given above do not include anything for interest or rentals, the net earnings being the same from which those charges are to be paid.

On this statement the Philadelphia *North American* comments as follows: "For the first half of last year the joint companies fell \$814,974 short of earning fixed charges; but the second half of the year being far more important and profitable to the anthracite coal trade, the surplus above fixed charges for the entire year was more than double that amount was earned over fixed charges for the second half. Last year's fixed charges were \$9,964,828, and these have been increased by \$350,060 interest on general mortgage bonds, \$240,000 on adjustment scrip, and \$120,000 on car trusts, making them \$10,674,828. To this must be added the interest on outstanding consolidated bonds, and from it must be deducted the interest on securities exchanged for said bonds or adjustment scrip. Mr. Gowen roughly estimates the convertibles on which coupons have been funded until 1885 at \$7,000,000, which would serve to deduct \$490,000 from this year's fixed charges. An estimate made at the time the plan of exchanges was announced last January showed a net reduction of \$965,064 in fixed charges as the result of a general acceptance of its propositions. Estimating that they have been accepted in the same proportion throughout as in the case of the convertibles, the reduction of fixed charges thereby would be about \$650,000, leaving the fixed charges about \$10,024,828. One-half of this is \$5,012,414, and the net earnings of the first half of the fiscal year are \$698,452 short of earning this. It will be observed that this is materially less than the deficit for the first half of last year, and indicates a surplus of about \$1,000,000 over fixed charges on the old interest and rentals, or almost enough to pay an entire year's dividends on the Jersey Central. Reading, however, has only \$278,448 to pay on Jersey Central stock this year, assuming that that road will earn at least its own fixed charges. The bears have been troubling themselves for fear the Reading could not meet its July interest on its old and new obligations. They forget that Reading does not pay a cent of rental to Jersey Central till Sept. 1. The lease was arranged so that the rental payments would not fall due in months when the Reading had other heavy fixed charges to meet. The money to pay Jersey Central's fixed charges will be paid by the Reading quarterly, in equal payments on Sept. 1, Dec. 1, March 1 and June 1."

The Philadelphia *Ledger* of June 25 says: "Frequent reference has been made in our columns to the agreement for the protection of the interests of the Lehigh Navigation Co. under the recent lease of the New Jersey Central Railroad to the Reading Co. The agreement is tripartite, and has been duly executed by all the companies under date of May 29, 1883. In order to secure the full development of the business of the Lehigh & Susquehanna Railroad and its branches, it is provided that the development of the Lehigh & Wilkesbarre coal lands in the Wyoming Valley shall proceed *pari passu* with that of the Reading coal lands, so that the production of the two coal estates shall bear to each other the proportion of 28 of the former to 72 of the latter until the Wyoming production shall reach 3,000,000 tons per annum, at which point it shall be thereafter maintained. Any deficiency in this ratio shall be supplied by other tonnage. The minimum annual rental of the Lehigh & Susquehanna Railroad is fixed at \$1,414,400, which is about the amount of its present rental, and the maximum is to be for any year prior to Dec. 31, 1887, \$1,728,700, and for any year thereafter prior to Dec. 31, 1892, \$1,885,800, and in any year thereafter, \$2,043,000. The Lehigh Navigation Co. is to receive in addition a sum equal to 7 per cent. per annum upon the amounts expended and to be expended on construction account. Finally, it is provided that this agreement is to be deemed and taken to be incorporated into the contract of lease of the Lehigh & Susquehanna Railroad of March 31, 1871, as if originally there written, and any breach of the new covenants shall give to the Lehigh Navigation Co. the right to declare the original lease, as well as this agreement, void, and the company may thereupon enter upon and repossess itself of its former estate. It will be seen that the foregoing applies to the railroad only, leaving the Lehigh Navigation Co. in full possession of its coal properties and canals as heretofore."

Richmond & Allegheny.—In Richmond, Va., June 25, the Circuit Court granted an application made by the second-mortgage bondholders and appointed Decatur Axtell, late General Manager, and Lawrence Myers, a director of the company, Receivers of the road, pending further litigation to enforce payment of interest or foreclosure the second mortgage. The first-mortgage bondholders did not oppose the appointment.

The company owns a line from Richmond, Va., to Clifton Forge, 230 miles, with a branch from Balcony Falls to Lexington, 20 miles, and leases the Henrico Branch, from Lorraine to Hungary, 11 miles. Nearly all of the road is built on the line of the old James River & Kanawha Canal, which the company purchased. By the last report there were

\$4,925,000 first-mortgage and \$97,000 improvement bonds; there was \$2,024,000 second-mortgage debt, and it is stated that \$1,000,000 second-mortgage bonds have also been pledged as collateral for loans. The road was completed and opened through a little over a year ago.

Richmond & Danville.—This company makes the following statement for its own and controlled lines for May and the five months ending May 31:

	May—1883.	May—1882.	Five months—1883.	Five months—1882.
Char., Col. & Aug.....	Gross, \$47,961	Net, \$8,949	Gross, \$349,685	Net, \$107,932
Col. & Greenv.....	37,308	5,577	335,113	131,199
Rich. & Dan.....	297,287	117,108	1,506,115	700,359
Va. Midland.....	137,766	52,131	597,944	222,637
Western N. C.....	27,523	9,561	123,103	41,803
Total.....	\$547,845	\$182,173	\$2,911,960	\$1,263,930
Total, 1882.....	482,621	108,813	2,634,852	702,951
Increase.....	\$65,224	\$73,360	\$277,108	\$560,979
Per cent.....	13.5	67.3	10.5	70.8

* Deficit.

For the five months all the lines show large increases in gross earnings, and still larger gains in net earnings.

Rutland.—Reports have been current for several months of irregularities in the management of this company, and the company has now brought a civil suit against J. M. Havens, for several years and until two months ago its Treasurer, and has attached all his property. It is charged that Havens, who had been speculating in the company's stock, issued without authority over 4,000 shares, which were sold on the Boston Exchange. It is said that this was discovered over two months ago, when James H. Williams was made acting Treasurer, but the officers of the company decided to keep it quiet and give Havens an opportunity to buy in the fraudulent stock. He has bought in some 2,400 shares, but not being able to get the rest, the company now brings suit. Whether any further action will be taken against him is not known.

St. Louis, Indianapolis & Eastern.—This company has been organized to build a railroad from Indianapolis southwest to Sullivan, Ind., about 85 miles. It is intended to be a coal road, and is a revival of an old project.

Securities on the New York Stock Exchange.—The Governing Committee of the New York Stock Exchange placed the following securities on the lists this week:

Atlantic & Pacific, \$4,000,000 additional first-mortgage bonds and \$3,000,000 additional income bonds; the \$25,000,000 stock was ordered listed "whenever it shall appear to the Committee that a reasonable amount has been distributed to the public."

Central Iowa, \$1,515,000 Eastern Division 6 per cent. bonds.

Chicago & Atlantic, \$6,500,000 first-mortgage 6 per cent. bonds. An application to list the stock was rejected.

Chicago, Burlington & Quincy, \$9,000,000 new 5 per cent. debenture bonds.

Evansville & Terre Haute, \$375,000 Mt. Vernon Branch 6 per cent. bonds.

Houston, East & West Texas, \$218,000 first-mortgage 7 per cent. bonds, and \$700,000 second-mortgage 6 per cent. bonds.

New York, Chicago & St. Louis, \$100,000,000 second-mortgage 6 per cent. bonds.

New York, New Haven & Hartford, \$2,000,000 registered 4 per cent. bonds.

Norfolk & Western, \$2,000,000 New River Division 6 per cent. bonds.

Northern Pacific, \$300,750, additional general mortgage 6 per cent. bonds.

Oregon & California, \$1,400,000 additional first-mortgage 6 per cent. bonds.

Philadelphia & Reading, \$6,000,000 first series consolidated mortgage 5 per cent. bonds; \$5,000,000 second series consolidated mortgage 5 per cent. bonds.

St. Paul, Minneapolis & Manitoba registered bonds of \$1,000 each as part of the issue of \$10,574,000 coupon bonds, 6 per cent. consolidated mortgage, listed June 13.

Texas & St. Louis, \$4,740,000 first-mortgage 6 per cent. bonds; \$4,740,000 second-mortgage income 6 per cent. bonds; \$3,945,000 general mortgage 6 per cent. bonds; \$3,945,000 land grant income 6 per cent. bonds; \$9,582,000 stock.

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